MAR 19980015: BUFFALO HILLS

Received date: Aug 13, 1998

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19980015

ASSESSMENT REPORT

BUFFALO HILLS PROPERTY (ALO1)

ASHTON MINING OF CANADA INC.

EAST PEACE DISTRICT
PROVINCE OF ALBERTA
1998

CONFIDENTIAL UNTIL SEPTEMBER 1999

Company:	Ashton Mining of Canada Inc.
Permit Agreement No.:	9396060030-9396060085 and 9396080083-9396080090 (inclusive)
Assessment Period:	June 18, 1996 to June 18, 1998
Location:	Buffalo Head Hills Area, Alberta
NTS:	84B/10, 84B/11, 84B/12, 84B/13, 84B/14, 84B/15, 84C/9, 84C/16, 84F/1, 84G/2, 84G/3 and 84G/4
Latitude:	57° N
Longitude:	115° 45'W
Legal Location:	West of 5th meridian, Tp 88-95. Rg 7-14
Author:	Dave Skelton, Terry Bursey
Date:	July 29, 1998

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SUMMARY

The Buffalo Hills property is located in the Buffalo Head Hills area of the East Peace District of northern Alberta. The area is comprised of Cretaceous rocks that overlie the Buffalo Head Terrane basement, a Proterozoic structural province of the Canadian Shield. The region is currently the focus of extensive exploration efforts as a result of the discovery of diamondiferous kimberlites on the Buffalo Hills Property by Ashton in early 1997.

This report summarises work completed in the property area by Alberta Energy Company Ltd. in 1995 and selected portions of an exploration program performed by Ashton Mining of Canada Inc. on the Buffalo Hills property from June 1996 to June 1998. Ashton is currently acting as operator of exploration programs on the property, in joint venture with Alberta Energy Company Ltd. and Pure Gold Minerals Inc.

In 1995, Alberta Energy Company Ltd. conducted an airborne geophysical survey in the Buffalo Hills area and anomalous magnetic targets were identified. Permits were acquired over a select area in 1996 and the anomalies were prioritised. Ashton Mining of Canada Inc. tested some of the promising targets during a winter drill program in 1997 which resulted in the discovery of 11 kimberlites. Based on these discoveries, Alberta Energy Company purchased additional airborne geophysical survey data and Ashton conducted a more detailed airborne survey over the Buffalo Hills property. A summer drill program resulted in the discovery of four kimberlites. Subsequent interpretation of the available data showed that four of the bodies originally identified as separate kimberlites from their geophsical signatures actually comprise two larger kimberlites. This interpretation brings the total number of kimberlites discovered during the programs to 13.

Samples of kimberlite drill core and chips were subjected to microdiamond testing and DMS analysis to test for the presence of diamonds. Eleven of the 13 kimberlites were confirmed diamondiferous and three of these returned significantly high diamond contents warranting further evaluation.

Exploration activities being applied for assessment purposes in this report include three airborne geophysical surveys, two drill programs, and associated laboratory analysis. Total expenditures of $3,291,853.31 were incurred duing these activities. Of this, $2,939,235 has been applied to hold all 64 Buffalo Hills MIMPs in good standing for a two year period to the year 2000. Excess expenditures of $276,480 have been allocated to maintain permits 9396060049, 9396060054 and 9396060058 in good standing until the year 2002. Excess costs of $76,138 allocated to permit 9396060050 are insufficient to maintain this permit past the year 2000.

INTRODUCTION

This report summarises selected work undertaken in the property area between 1995 and 1998, including three airborne geophysical surveys, two diamond drill programs and associated laboratory analysis. Other exploration activities were completed during the 1996-1998 assessment period, however the associated expenditures are not being applied with this filing and consequently these activities are not discussed in this report.

The initial work was performed by Alberta Energy Company Ltd. An airborne geophysical survey was flown in 1995 which revealed circular magnetic anomalies characteristic of kimberlite pipes. This data was used to select an area for metallic and industrial minerals permit acquisition. Target drilling and additional geophysical work performed by Ashton in 1997 and 1998 led to the discovery of 13 kimberlites. Samples were collected as a result of the drilling and tested for diamond content.

LOCATION AND ACCESS

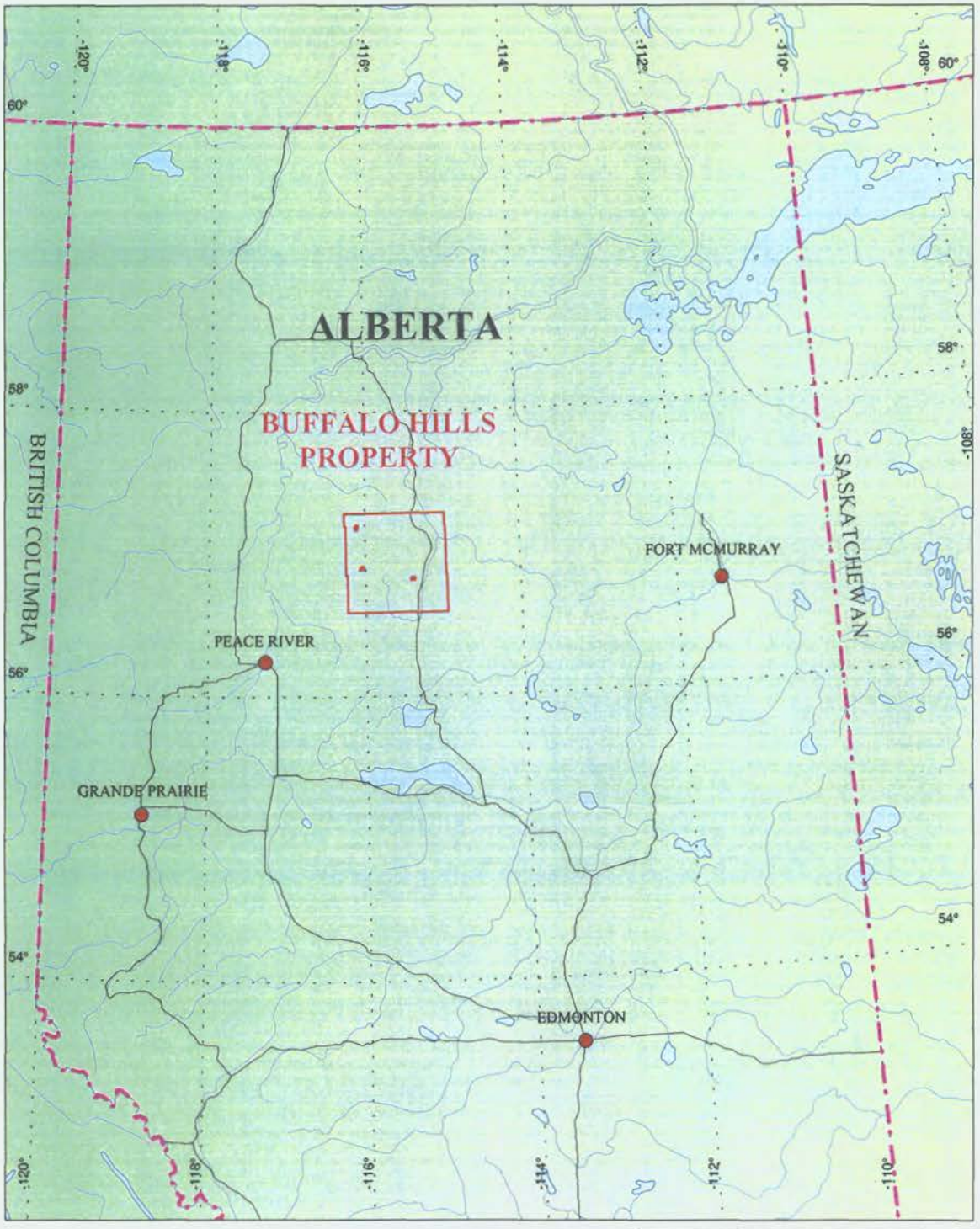
The Buffalo Hills property is located in the Buffalo Head Hills area of the East Peace District of northern Alberta (see Figure 1). Highway 88 transects the property near the eastern boundary. Highway 686 parallels the southern boundary and is paved from the town of Peace River to the village of Cadotte Lake. Numerous private forestry and petroleum roads of variable quality exist within the southern and eastern areas of the property. Extensive seismic work has been conducted in the area and lines are found throughout the property. The community of Peace River to the west of the property has an airport with scheduled commercial flights; charter service is available in Slave Lake to the south. Near the southeast corner of the property the hamlet of Red Earth hosts a paved airstrip in excellent condition.

All field operations were conducted from a base camp (Church Camp) established on an Alberta Energy Company LOC in the Ogston area in the south of the Buffalo Hills Property. Field crews stationed at this camp utilised a combination of trucks, 4x4 RVs and helicopters to access work sites.

The permits are located on the NTS map sheets 84B/10, 84B/11, 84B/12, 84B/13, 84B/14, 84B/15, 84C/9, 84C/16, 84F/1, 84G/2, 84G/3 and 84G/4. The legal locations are townships 88-95 and ranges 7-14, all west of the 5th meridian. The coordinates of the center of the permit group are 57° N and 115°45' W. The property is approximately 400 km north-northwest of Edmonton, Alberta.

PHYSIOGRAPHY

The property is located within the boreal forest of the Peace River drainage basin and has mature coniferous trees, low-lying bogs, and occasional shallow lakes. The western half of the property, underlain by the gently east-sloping Buffalo Head Hills has a relief in the order of 300 metres. The eastern half of the property has an average elevation of approximately 550 metres and is essentially flat-lying with grassy swamps, meandering rivers and boggy forests. Glacial deposition occurred throughout the region during the Wisconsinan retreat of the Laurentide ice sheet. The predominant direction of glacial movement was to the south-southwest at 180° to 235°. Clay-rich till deposits dominate the western half of the property. Lacustrine sediments and localized glaciofluvial gravels are found in the east. Rare bedrock exposures confined to Cretaceous outcroppings are present near the top of the Buffalo Head Hills. Glacial sequences up to 150 meters deep were intersected in boreholes on the eastern half of the block. The region is subject to a continental climate characterized by hot summers and cold winters.



MAP LOCATION

Ashton Mining of Canada Inc.

Date: March 25, 1998	Figure 1
Author: A.Marshall	Buffalo Hills Property, Alberta
Office: Vancouver	Property Location Map
Drw: Property Location Map.Wor	
Proj: UTM Zone 11	

0 50 100 Kilometers

Scale : 1:5 000 000

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PERMIT TABULATION

The property comprises 64 permits covering 1,452,569.94 acres situated in the East Peace District of the Province of Alberta, Canada (see Appendix B, Permit Location Map).

The permits are registered to Antelope Land Services, a subsidiary of Alberta Energy Company Ltd. (see Appendix B, Schedule of Permits). As the project operator, Ashton Mining of Canada Inc., is conducting exploration on the property in partnership with Alberta Energy Company Ltd. and Pure Gold Minerals Inc.

REGIONAL GEOLOGY

BEDROCK GEOLOGY

Bedrock in Alberta ranges in age from Archean to Recent. Exposures are roughly divided into several broad belts crossing the province from the northeast to the southwest (see Figure 2).

Undifferentiated Archean granitoids and metasedimentary Shield rocks of the Churchill Structural Province are located in the northeast corner of Alberta. A flat-lying sequence of clastic Proterozoic Athabasca Group sediments up to 1,200 metres thick outcrops to the south of Lake Athabasca. The Shield rocks underlie a sequence of westerly-dipping Paleozoic strata comprising Middle and Upper Devonian marine shales, carbonates and evaporites. Near the edge of the Shield subsurface dissolution of the evaporitic units has resulted in extensive brecciation of Devonian strata. In central and western Alberta interbedded Paleozoic clastic marine sediments and carbonates from the Cambrian to the Permian are present in unconformity-bounded sequences up to 3,000 metres thick.

The Jurassic in Alberta was marked by cyclical marine transgressions as the continental margin became progressively active, resulting in interfingered marine and continental sediments. In the Northeastern Interior Plains marine to deltaic clastic Lower Cretaceous strata unconformably overlie Paleozoic rocks. Cretaceous sequences are found extensively throughout the province, up to 2,000 metres thick in the subsurface.

Tertiary rocks overlie the Cretaceous strata in a belt along the foothills from southern Alberta to just south of Grand Prairie. Continental sedimentation continued into the Paleocene in response to uplift and erosion in the eastern Rocky Mountains. The final stages of uplift and sedimentation likely occurred during the Eocene to Oligocene epochs.

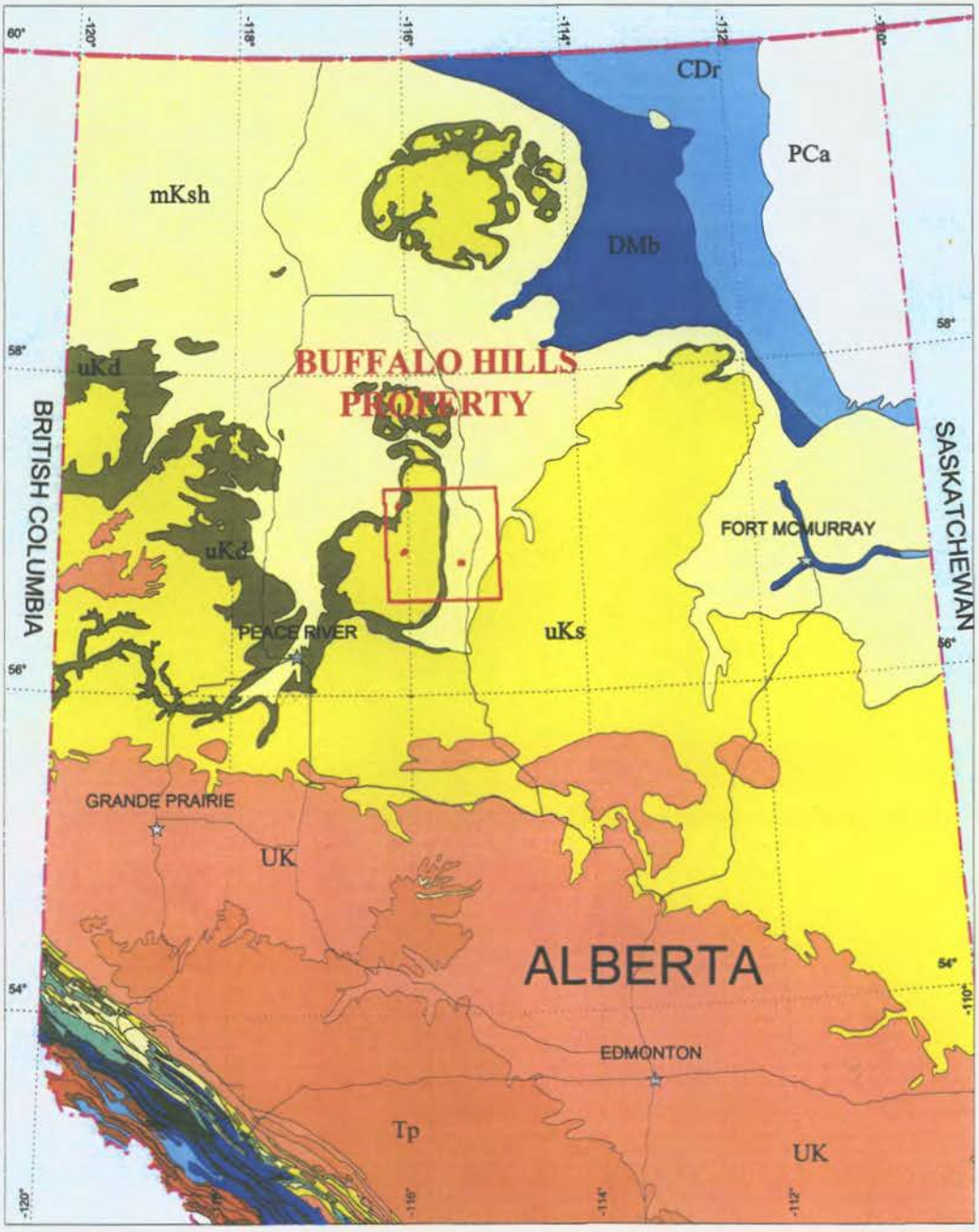
The Precambrian basement rocks of northern Alberta, interpreted as the western extension of the Churchill Structural Province, are subdivided into distinct tectono-metamorphic domains. These range from Archean to Early Proterozoic. Most of the basement in northern Alberta falls into one of two categories: accreted juvenile Proterozoic terrane or thermally reworked Archean units from the Rae Subprovince.

STRUCTURAL GEOLOGY

There are a number of regional structures influencing northern Alberta. The Great Slave Lake Shear Zone (GSLSZ), a crustal lineament striking northeast in the northwest corner of the province, was active about 1.9 Ga although tectonic movement probably continued intermittently into the Devonian. The Snowbird Tectonic Zone (STZ), striking northeast through the center of the province, is interpreted to bifurcate the underlying Churchill Structural Province into two distinct basement domains. The Peace River Arch is a complex, deeply-rooted structural feature characterized by uplift and subsidence which trends easterly between and subparallel to the STZ and GSLSZ. It was active from the Late Proterozoic to the Late Cretaceous.

QUATERNARY GEOLOGY

Episodic glacial advances from the north and east, off the Canadian Shield (Laurentide), and from the west out of the Cordillera and Rocky Mountains, deposited a complex Quaternary sequence of glacial, fluvial and lacustrine deposits over most of the province (see Figure 3). The interaction between the ice advances is poorly understood. Deposits attributed to Cordilleran-Rocky Mountain glacial advances have a minimum age of 720,000 years and may be older than 2,470,000 years. Deposits from the continental Laurentide advances are dated at 120,000 years or older.



MAP LOCATION

LEGEND

- PreCambrian - Athabasca Fm (PCa)
- Cambrian Devontian - Rocky Mountains Fm (CDr)
- Devonian Mississippian - Besa River Fm (DMb)
- Triassic - Paskapoo Fm (Tp)
- Upper Cretaceous - Smokey Gp (uKs)
- Upper Cretaceous - Dunvegan Fm (uKd)
- Undifferentiated Cretaceous - Scollard & Wapiti FM (UK)
- Mid Cretaceous - Shaftesbury Fm (mKsh)

Ashton Mining of Canada Inc.

Figure 2

Buffalo Hills Property, Alberta
Regional Geology Map

Date:May 20 , 1998

Author: A.Marshall

Office: Vancouver

Drw: Regional Geology Map.Wor

Proj: UTM Zone 11

0 50 100
Kilometers

Scale : 1:5 000 000

Sources: Hamilton, W.N. and Olson, R.A.,1964 Mineral Resources of the Western Canada Sedimentary Basin. In G.M. Mossop and I. Shetsen (eds.). Atlas of the Western Canada Sedimentary Basin. Alberta Geological survey of the Alberta Geological survey of the Alberta Research Council, and Canadian Society of Petroleum Geologists, p. 483-501

Geological Highway Map of Alberta by: Canadian Society of Petroleum Geologists Map Committee Chairman: Paul Jerkanen Second Edition 1981

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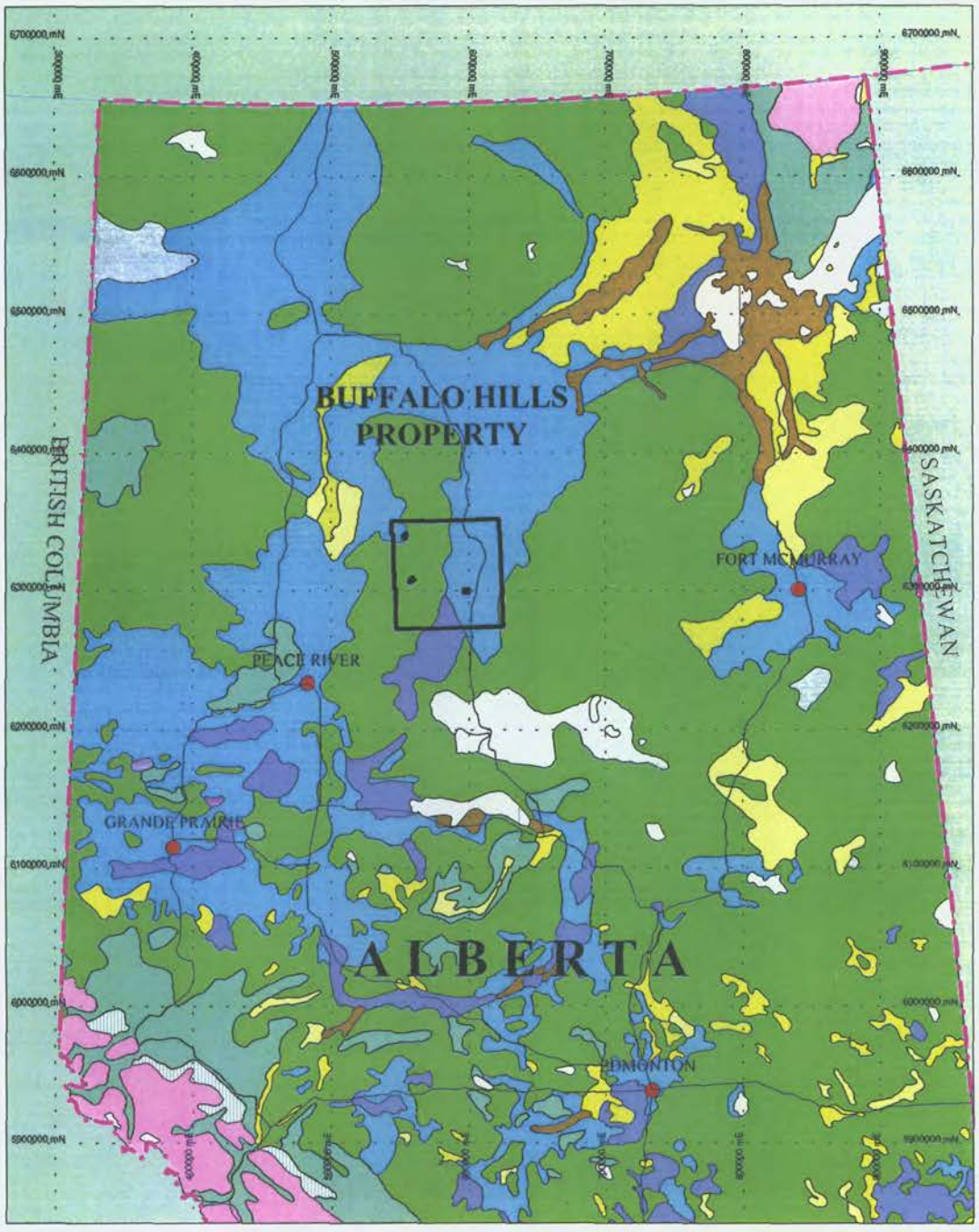


MAP LOCATION

SURFICIAL MATERIALS LEGEND

- Colluvial Blocks
- Colluvial Rubble
- Colluvial Fines
- Colluvial Sand
- Fine grained (glacio) Lacustrine
- Coarse grained (Glacio)Lacustrine
- Fine grained (Glacio)Marine
- Coarse grained (Glacio)Marine
- Glaciers
- Alluvial Deposits
- Marine Mud
- Marine Sand
- Lacustrine Mud
- Lacustrine Sand
- Eolian Deposits
- Organic Deposits
- Lag (Glacio)Marine
- Glaciofluvial Plain
- Glaciofluvial Complex
- Till Blanket
- Till Veneer
- Quaternary Volcanics
- Alpine Complexes
- Undivided
- Eskers
- End and Interlobate Moraine
- General Ice Flow (Known)
- General Ice Flow (Unknown)
- Former Ice-limits (Wisconsinan)
- Former Ice-limits (Maximum Glaciation)
- End Moraine

Ashton Mining of Canada Inc.

Figure 3

Buffalo Hills Property, Alberta
Regional Surficial Geology Map

Date: April 20, 1998	
Author: A.Marshall	
Office: Vancouver	
Drw: Regional Geology Map.Wor	
Proj: UTM Zone 11	

Surficial Materials of Canada (Map 1800A)
Geological Survey of Canada
Compiled by: R.J. Fulton
1998

0 50 100
Kilometers

Scale : 1:5 000 000

1 9980015

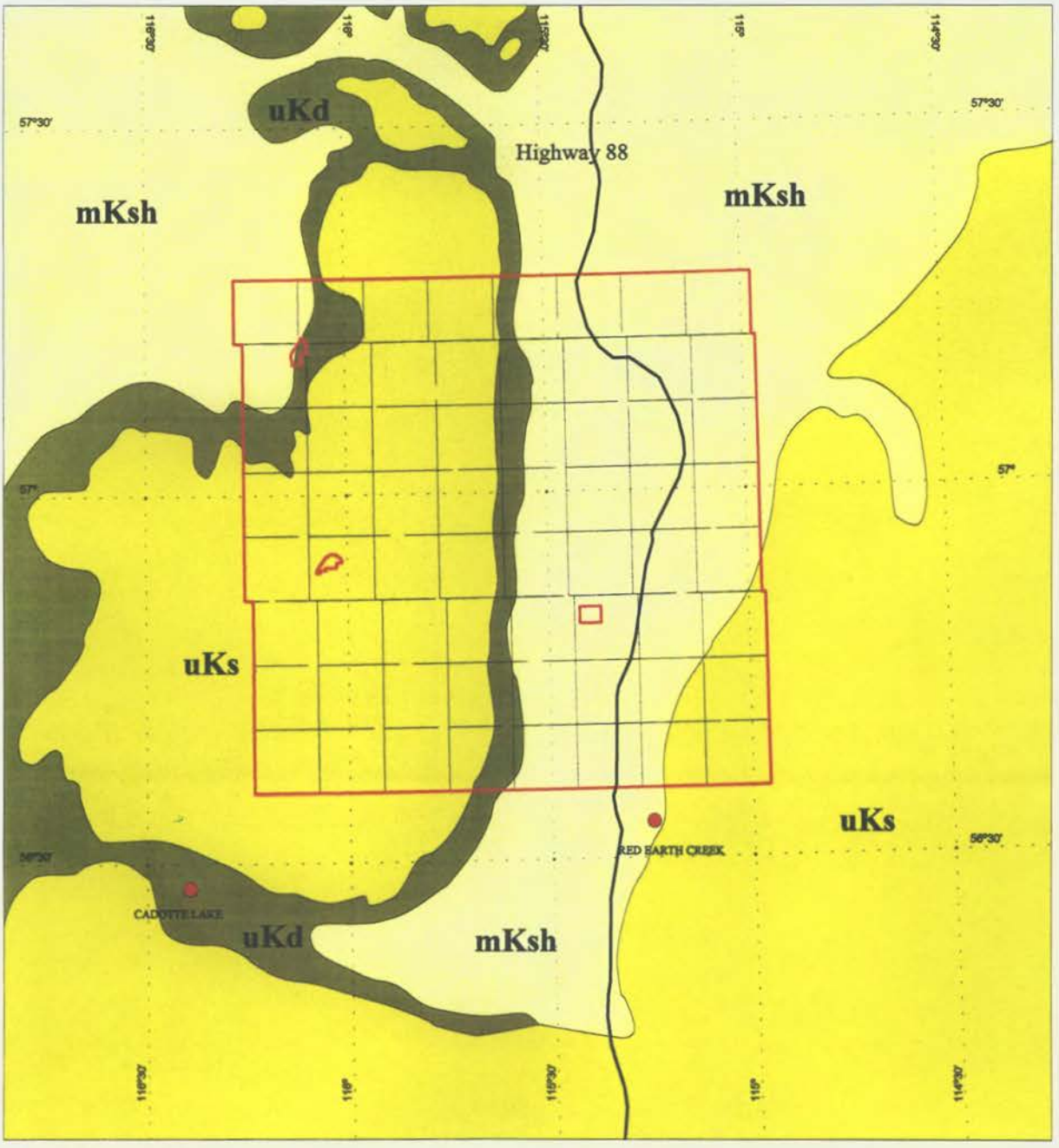
PROPERTY GEOLOGY

BEDROCK GEOLOGY

Three Cretaceous sedimentary formations underlie the Buffalo Hills property (see Figure 4): Upper Cretaceous Smokey Group (uKs), Upper Cretaceous Dunvegan Formation (uKd) and Middle Cretaceous Shaftsebury Formation (mKsh). The Smokey Group forms the top of the Buffalo Head Hills. Interpreted as a marine foredeep, the Smokey Group is a dark grey shale that is sideritic to calcareous in composition. Underlying the Smokey Group is the older Dunvegan Formation which is a marine unit of conglomerate, sandstone, siltstone and shale that is locally expressed in the geology. This is correlated regionally with the Trevor Formation, a southwesterly-derived clastic wedge of interbedded calcareous and glauconitic sandstone and mudstone, bentonilic shale and local ironstone lenses. The oldest unit, the Shaftsebury Formation, underlies the eastern third of the property in the Wabasca River valley. Interpreted as a foredeep clastic wedge, it is both marine and non-marine in origin, consisting of deltaic fine-grained quartzose sandstone, a dark gray fossiliferous silty shale and laminated siltstone.

SURFICIAL GEOLOGY

Two distinct glacial depositional features typify the geology of the property (see Figure 5). The western half of the property in the Buffalo Head Hills area is covered by a blanket of glacial till which varies from shallow cover with localised Smoky Group outcroppings in the north half to depths greater than 50 metres in the south. Fine to coarse-grained glaciolacustrine sediments capping a glacial sequence up to 150 metres deep dominate the eastern half of the permit block. Directional features indicative of glacial movement over the property are rare. Generally, ice movement is interpreted to have been from northeast to southwest, however evidence of movements to the south and southeast has been noted.



PROPERTY LOCATION

LEGEND

- Upper Cretaceous - Smokey Group (uKs)
- Upper Cretaceous - Dunvegan Fm (uKd)
- Mid Cretaceous - Shaftsebury Fm (mKsh)

Ashton Mining of Canada Inc.

Figure 4

Buffalo Hills Property, Alberta
Property Geology Map

Kilometers

Scale 1:1 000 000

Hamilton, W.N. and Olson, R.A., 1994
Mineral Resources of the Western Canada Sedimentary Basin.
In G.M. Mossop and I. Shetsen (eds.) Atlas of the Western
Canada Sedimentary Basin. Alberta Geological survey of the
Alberta Geological survey of the Alberta Research Council,
and Canadian Society of Petroleum Geologists, p. 485-501

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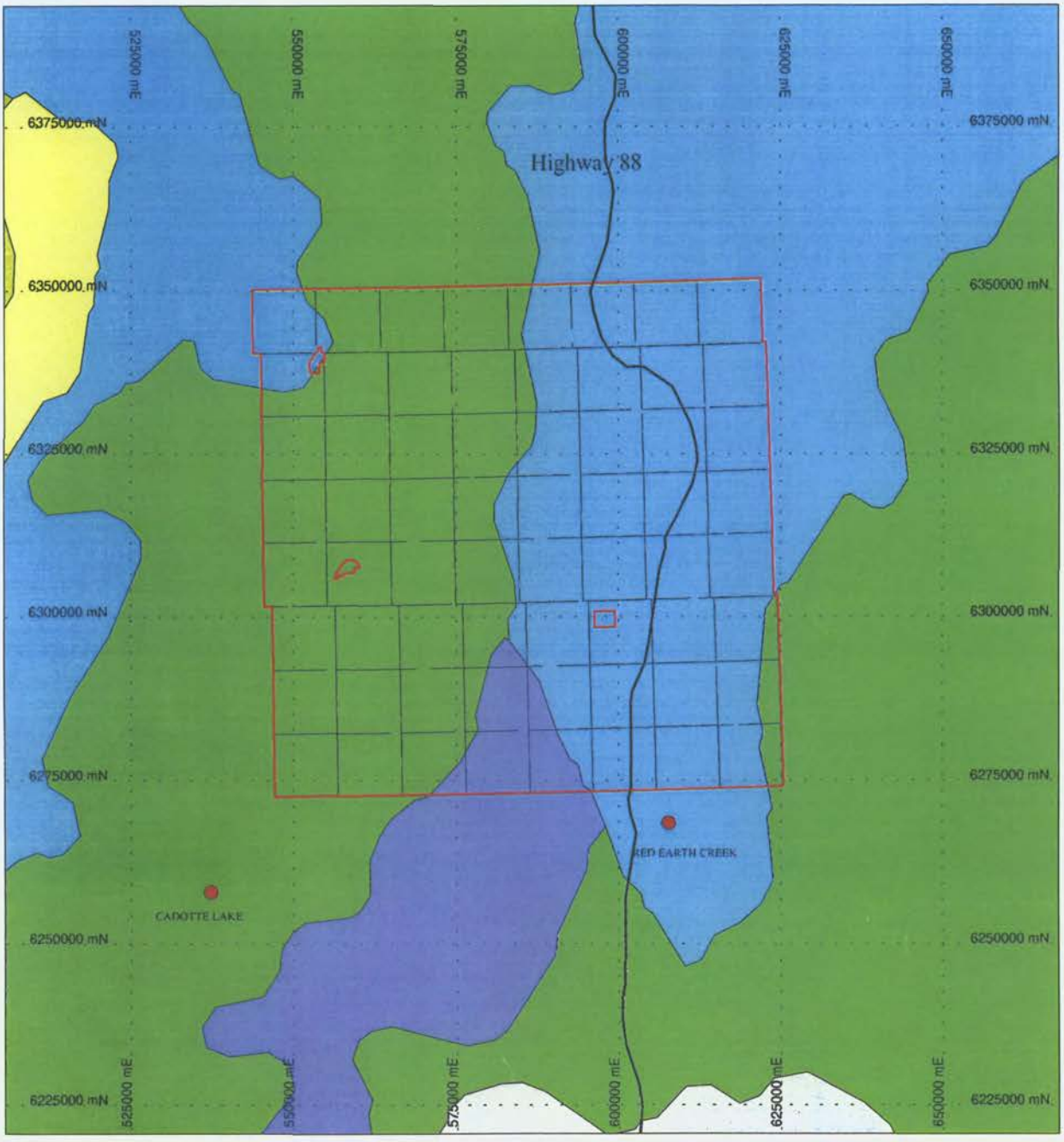

PROPERTY LOCATION

SURFICIAL MATERIALS LEGEND

- Lag (Glacio)Marine
- Glaciofluvial Plain
- Glaciofluvial Complex
- Till Blanket
- Till Veneer
- Quaternary Volcanics
- Eolian Deposits
- Organic Deposits
- Alluvial Deposits
- Lacustrine Mud
- Lacustrine Sand
- Fine grained (glacio) Lacustrine
- Coarse grained (Glacio)Lacustrine
- Fine grained (Glacio)Marine
- Coarse grained (Glacio)Marine
- Eskers
- End and Interlobate Moraine
- General Ice Flow (Known)
- General Ice Flow (Unknown)
- Fromer Ice-limits (Wisconsinan)
- End Morains

Ashton Mining of Canada Inc.

Date: April 17, 1998

Author: A. Marshall

Office: Vancouver

Drw: Property Geology Map.Wor

Proj: UTM Zone 11

Figure 5

Buffalo Hills Property, Alberta
Property Surficial Geology Map

Surficial Materials of Canada (Map 1880A)
Geological Survey of Canada
Compiled by: R.J. Fulton
1996

0 10 20
Kilometers

Scale 1:1 000 000

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WORK PERFORMED

AIRBORNE GEOPHYSICS

The expenditures for three high resolution aeromagnetic surveys are being applied for the 1996-1998 assessment period. The East Peace River Arch Survey was flown by Sander Geophysical Ltd. and the Utikuma Lake Project and Red Earth Project surveys were flown by Terraquest Ltd. Spectra Exploration Geoscience Corporation was retained to manage the Red Earth Project Survey and commissioned the remaining two surveys as speculative surveys available for purchase by industry. The specifications of each survey are included in Appendix C.

East Peace River Arch Aeromagnetic Survey (Ogston Survey)

The East Peace River Arch high resolution aeromagnetic survey was flown in February and March 1995 and covered townships 89-96 and ranges 7-14 (west of the 5th meridian). The survey was flown by Sander Geophysical Limited under contract to Spectra Exploration Geoscience Corporation. Traverse lines were oriented east-west at 600 metres line spacing and tie lines were oriented north-south at 1,824 metres line spacing.

Utikuma Lake Project Aeromagnetic Survey

The Utikuma high resolution survey was flown between April 15 and July 30, 1996 by Terraquest Ltd. under contract to Spectra Exploration Geoscience Corporation. The survey covered a total of 32,000 square kilometres in townships 70-90 and ranges 3-18 (west of the 5th meridian). Traverse lines were oriented to intersect the regional geology and structure in such a way as to provide optimum contour patterns of geophysical data. The traverse line interval was 600 metres and tie lines were spaced at 1,800 metres or less.

Red Earth Project Aeromagnetic Survey

A detailed fixed-wing airborne magnetic survey was conducted over the Buffalo Hills Property in townships 88-95 and ranges 7-14 (west of the 5th meridian) between May and September 1997. The survey was flown by Terraquest Ltd. and totalled approximately 31,800 line kilometres. Spectra Exploration Geoscience Corporation of Calgary was retained by Ashton Mining of Canada to manage the field operations. The survey consisted of 250 metre-spaced lines flown in a N-S direction with tie lines at 1,250 metre intervals.

DRILLING

Expenditures from two diamond drill programs on the Buffalo Hills property are being applied for the 1996-1998 assessment period. These programs focused on the testing of magnetic anomalies for the presence of kimberlite and outlining a limited geometry of the kimberlites encountered.

During the two drill programs 48 diamond drill holes and 15 reverse circulation holes were completed for a total of 6,787.3 metres and 990.61 metres respectively (see Appendix D,

Summary of Diamond Drilling and Summary of Reverse Circulation Drilling). NQ and HQ-sized holes were used. A combination of Nodwell mounted and heliportable diamond drills was employed depending upon the access restrictions at the time of drilling.

The core was logged both in the field and in Ashton's North Vancouver laboratory. Typed drill logs and a map showing drill hole site and access locations are presented in Appendix D.

Winter Program 1997

The winter diamond drill program commenced on January 15, 1997 and was completed on February 27, 1997. Seventeen NQ-sized holes were drilled into 10 magnetic anomalies for a total of 2,227.3 metres. The anomalies drilled included: 4A, 4B, 4C, 5A, 5B, 6, 7A, 7B, 7C and 14. This resulted in the discovery of 10 kimberlites. Four drill sites were prepared for summer drilling on anomalies 2, 1A, 1B and 19. An eleventh kimberlite was discovered during the site preparation on anomaly 2. Kimberlites K5A and K5B were later interpreted to comprise one large body, designated K5.

The drilling was performed by Connors Drilling, based in Kamloops, B.C. The equipment used included a Nodwell mounted Boyles 37A diamond drill, a Whipple BOP and a Whipple Table filtration device for cleaning the return. Drill site preparation was undertaken by Clemlyn Holdings of Grand Prairie using a D6 bulldozer.

Summer Program 1997

The summer drill program commenced on July 5, 1997 and concluded on August 31, 1997. Thirty-one diamond drill holes (DDH) and 15 reverse circulation holes (RC) were completed for a total of 4,560 metres and 990.61 metres respectively. The DDH holes varied in size from NQ to HQ. Connors Drilling completed the diamond drilling using a Nodwell 37A diamond drill and two 25A heliportable diamond drills. Midnight Sun Drilling Co. Ltd. employed a heliportable 4150 rig for the reverse circulation drilling. All drills were transported by a Hughes 500D helicopter provided by Great Slave Helicopters. Four new kimberlites were discovered through drilling on anomalies 1A, 1B, 14C and 19. K14C was later interpreted to comprise part of the large K14 complex.

LABORATORY PROCEDURES AND RESULTS

Microdiamond recovery was performed at Ashton Mining of Canada Inc.'s laboratory in North Vancouver, BC and at Ashton Mining Limited's laboratory in Perth, Australia. Samples up to 75 kg were processed utilizing caustic fusion dissolution after controlled rock crushing and grinding. The fusion residue was observed twice for diamonds. Routine quality control testing was used to ensure diamond recovery in the +150/-32 Tyler mesh sample size fraction. Larger samples (over 450kg) were processed in a Van Eck & Lurie one tonne per hour dense media separation (DMS) plant and the concentrates were observed twice for diamonds.

MICRODIAMOND RESULTS

Microdiamond testing was conducted on samples from K1A, K1B, K4A, K4B, K4C, K5(A+B), K6, K7A, K7B, K7C, K(14+14C) and K19. The results are summarized in a table in Appendix E.

Eleven of the 13 kimberlites discovered returned microdiamonds. Of these, three kimberlites (K5, K6, and K14) returned results with interesting diamond counts indicating that these pipes contain diamonds that are larger than 0.5 mm. Kimberlites K14 and K6 yielded a quantity of diamonds considered sufficient to warrant further investigation. The ratio of +0.5 mm stones to -0.5 mm stones in these kimberlites was also deemed encouraging.

DMS RESULTS

DMS analysis was completed on material from K1, K2, K4, K5, K6, K14, and K19. The results are summarized in a table in Appendix E.

The K6 sample contained very few diamonds, however a 0.76 carat yellow stone with very few inclusions was recovered. Despite the low total stone count, the presence of the yellow diamond indicates that further sampling of K6 is warranted.

The diamonds recovered from K14 include 110 stones greater than 0.8 mm. This suggests a population of commercial-sized stones may be present in K14. The calculated grade, based on the 12.3154 tonnes recovered, is approximately 33.8 carats/100 tonnes for stones > 0.5 mm, however, this value is not considered reliable. Because of the small sample size, grade or valuation calculations at this stage of evaluation are generally regarded as preliminary and subject to change.

CONCLUSIONS

Airborne magnetic surveying and target drilling were used to locate 13 kimberlite bodies on the Buffalo Hills property. Kimberlite material collected from the drilling of 48 diamond drill holes and 15 reverse circulation holes was analyzed in the laboratory for diamond content and 11 bodies were found to contain diamonds. Of these, three kimberlites (K14, K5 and K6) yielded sufficient quantities of diamonds to warrant further evaluation. This evaluation will take the form of larger and more representative samples. Drilling of magnetic anomalies will also be undertaken since this geophysical technique has proven to be very effective in identifying the location of kimberlite bodies on the property.

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CERTIFICATE OF QUALIFICATIONS - DAVE SKELTON

I, Dave Skelton, of [redacted] Vancouver, British Columbia, hereby certify that:

1. I am a graduate of the University of Western Ontario and hold a B.Sc. degree in geology,
2. I am presently employed as a project geologist with Ashton Mining of Canada Inc. at Unit 123, 930 West 1st Street, North Vancouver, B.C., V7P 3N4, and
3. I have been employed by various mining companies since 1986.
4. The information, conclusions and recommendations in this report are based on work in Alberta and on the property, in collaboration with colleagues involved in various aspects of exploration.

Dated at Vancouver, British Columbia, this 29th day of July, 1998.

ASHTON MINING OF CANADA INC.

[redacted]

Dave Skelton, B.Sc.

CERTIFICATE OF QUALIFICATIONS - TERRY BURSEY

I, Terry Bursey, of [redacted] Vancouver, British Columbia hereby certify:

1. I am presently employed as a geologist with Ashton Mining of Canada Inc. at Unit 123, 930 West First Street, North Vancouver, B.C. V7P 3N4.
2. I am a graduate of Carleton University and hold a B.Sc., Hons degree in Geology, (1990).
3. I have been employed with various governmental geology divisions and the mineral exploration industry since 1987 and have practiced my profession since graduation.
4. That the information, conclusions and recommendations in this report are based on results of work in Alberta. and on the property, in collaboration with colleagues involved in various aspects of exploration.

DATED at North Vancouver, British Columbia, this 29th day of July, 1998.

ASHTON MINING OF CANADA INC.

[redacted]

Terry Bursey, B.Sc., Hons

APPENDIX A

PROPERTY COSTS BREAKDOWN
EXPENDITURE ALLOCATION TABLE

Buffalo [redacted] (AL01)
Property Costs Breakdown

	Jun 96-Sep 97 Drilling	Jun 96-May 98 Airborne Geophysics	Total
	$	$	$
Air Support	458,056.86		458,056.86
Field Labour and Geologist's Salaries	171,931.12		171,931.12
Field Materials and Freight	117,792.71		117,792.71
Camp Costs	265,914.98		265,914.98
Communications	30,428.86		30,428.86
Office supplies (maps/photocopies) and other office expenses	29,894.87		29,894.87
Processing and Observing Laboratory	403,806.15		403,806.15
Consultants/Contractors	1,183,285.36		1,183,285.36
Red Earth Aeromagnetic Survey		270,742.40	270,742.40
H. R. A. M. Survey of North Ogston Area-Data Acquisition		200,000.00	200,000.00
H. R. A. M. Survey of East Utikima-Data Acquisition		160,000.00	160,000.00
	2,661,110.91	630,742.40	3,291,853.31

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Expenditure Allocation Table

$3,291,853.31

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Permit Agreement No.	Area (hectares)	Effective Date	Spend On AP* 1	Spend On AP2	Carry Over	spending to date	AP 1	AP 2	Next Due Date
9396060054	**9,216**	**18-Jun-96**	**46,080**	**92,160**	**0**	**138,240**	**PAID**	**PAID**	**18-Jun-02**
9396060058	**9,216**	**18-Jun-96**	**46,080**	**92,160**	**0**	**138,240**	**PAID**	**PAID**	**18-Jun-02**
9396060049	**9,216**	**18-Jun-96**	**46,080**	**92,160**	**0**	**138,240**	**PAID**	**PAID**	**18-Jun-02**
9396060050	**9,216**	**18-Jun-96**	**46,080**	**76,138**	**(16,022)**	**122,218**	**PAID**	**18-Jun-00**	**18-Jun-00**
9396060077	8,674	18-Jun-96	43,370		0	43,370	PAID	18-Jun-00	18-Jun-00
9396060071	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060076	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060068	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060060	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060059	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060053	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060052	8,605	18-Jun-96	43,025		0	43,025	PAID	18-Jun-00	18-Jun-00
9396060039	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060038	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060037	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060073	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060069	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396080085	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396080084	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396060081	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060079	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060078	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060067	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060065	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060047	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060031	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060030	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060057	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060056	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060055	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060051	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060048	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060044	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060043	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060042	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060041	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060040	8,448	18-Jun-96	42,240		0	42,240	PAID	18-Jun-00	18-Jun-00
9396060082	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396080090	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00

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Expenditure Allocation Table

$3,291,853.31

Permit Agreement No.	Area (hectares)	Effective Date	Spend On AP* 1	Spend On AP2	Carry Over	spending to date	AP 1	AP 2	Next Due Date
9396080089	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396080088	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396080087	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396080086	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396080083	9,216	29-Aug-96	46,080		0	46,080	PAID	29-Aug-00	29-Aug-00
9396060085	9,215	18-Jun-96	46,075		0	46,075	PAID	18-Jun-00	18-Jun-00
9396060084	9,161	18-Jun-96	45,805		0	45,805	PAID	18-Jun-00	18-Jun-00
9396060083	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060080	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060075	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060074	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060072	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060070	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060066	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060064	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060063	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060062	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060061	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060046	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060045	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060036	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060035	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060034	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060033	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
9396060032	9,216	18-Jun-96	46,080		0	46,080	PAID	18-Jun-00	18-Jun-00
Total			2,939,235	0					
Total Auto-Applied			2,939,235	352,618					
Auto-App Principle			3,291,853	352,618					
Auto-App Remaining			352,618	0		* *"AP" refers to assessment period.*			

ALLOCATION INTENTIONS:

1. Allocation of exploration expenditures relating to drilling programs to September 1997and Red Earth, Ogston and Utikima airborne geophysical surveys to maintain all 64 Buffalo Hills MIMPs in good standing to the year 2000.
2. Excess expenditure totalling $352,618 allocated to maintain 9396060049, 9396060054, 9396060058 in good standing to 2002.

APPENDIX B

PERMIT LOCATION MAP
SCHEDULE OF METALLIC AND INDUSTRIAL MINERALS PERMITS

Appendix B
Schedule of Metallic and Industrial Minerals Permits

	Location							
Permit Agreement No.	Mn	Rg	Tp	Sections	Area (hectares)	Recorded Title	Effective Date	Assessment Due Date
9396060085	5	14	95	1N,SEP,SW;2-36 Excepting Portion(s) Lying Easterly of Bison Lake	9,215.00	Antelope	18-Jun-96	18-Jun-98
9396060084	5	13	95	1-5;6N,SE,SWP;7-36 Excepting Portion(s) Lying Easterly of Bison Lake	9,161.00	Antelope	18-Jun-96	18-Jun-98
9396060083	5	12	95	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060082	5	11	95	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060081	5	10	95	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060080	5	9	95	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060079	5	8	95	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060078	5	7	95	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060077	5	14	94	1-24;25E;26NP,SEP,SW; 27-34; 35SP,NW,NEP; 36NWP Excepting Portion(s) Lying Easterly of Bison Lake	8,674.00	Antelope	18-Jun-96	18-Jun-98
9396060076	5	13	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060075	5	12	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060074	5	11	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060073	5	10	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060072	5	9	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060071	5	8	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060070	5	7	94	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060069	5	14	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060068	5	13	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060067	5	12	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060066	5	11	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060065	5	10	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060064	5	9	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060063	5	8	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060062	5	7	93	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060061	5	14	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060060	5	13	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060059	5	12	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060058	5	11	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060057	5	10	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060056	5	9	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060055	5	8	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060054	5	7	92	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060053	5	14	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98

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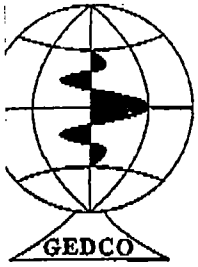
	Location							
Permit Agreement No.	Mn	Rg	Tp	Sections	Area (hectares)	Recorded Title	Effective Date	Assessment Due Date
9396060052	5	13	91	1-16;17S,NE,L11;L12;18S, NW,NEP;19N,SEP,SW;20WP ; 21SE,NEP;22-27;28SP,N;29SP,N;30-36 Excepting Portion(s) Lying Southerly of Haig Lake	8,605.00	Antelope	18-Jun-96	18-Jun-98
9396060051	5	12	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060050	5	11	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060049	5	10	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060048	5	9	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060047	5	8	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060046	5	7	91	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060045	5	14	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060044	5	13	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060043	5	12	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060042	5	11	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060041	5	10	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060040	5	9	90	1-18;19S,NW;20S;21S,NE; 22-27;28E;30W;31-36	8,448.00	Antelope	18-Jun-96	18-Jun-98
9396060039	5	8	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060038	5	7	90	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060037	5	14	89	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060036	5	13	89	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060035	5	12	89	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060034	5	14	88	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060033	5	13	88	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060032	5	12	88	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060031	5	11	88	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396060030	5	10	88	1-36	9,216.00	Antelope	18-Jun-96	18-Jun-98
9396080083	5	7	88	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080084	5	8	88	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080085	5	9	88	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080086	5	7	89	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080087	5	8	89	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080088	5	9	89	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080089	5	10	89	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
9396080090	5	11	89	1-36	9,216.00	Antelope	29-Aug-96	29-Aug-98
64					*587,847.00*	***1,452,569.94***		
Total Permits					*Total Hectares*	***Total Acres***		

APPENDIX C

EAST PEACE RIVER ARCH AEROMAGNETIC SURVEY
UTIKUMA LAKE PROJECT AEROMAGNETIC SURVEY
RED EARTH PROJECT AEROMAGNETIC SURVEY
(OPERATIONAL REPORTS AND MAPS)



Geophysical Exploration & Development Corporation

East Peace River Arch

by

John W. Peirce, P. Geoph.,

Erwin J. Ebner and Nathalie Marchand

July, 1995

Updated: Sept., 1995

Suite 2000, 700 Sixth Ave. S.W., Calgary, Alberta, Canada T2P 0T8

Executive Summary

The East Peace River Arch High Resolution AeroMagnetic (HRAM) survey was flown in February-March, 1995, as a proprietary survey organized by Spectra Exploration Geoscience Corporation on behalf of Alberta Energy Company (AEC). A previous pilot project over the Ogston Block and Golden West areas had proved quite successful as a template to test the applicability of high resolution aeromagnetic surveying to exploration over the faulted basement in the area of the eastern Peace River Arch. This survey was designed to extend the coverage to the north, west and east to cover areas with potential for extending the successful Ogston play. In particular, one objective was to develop a comprehensive interpretation of the basement structural grain in order to use as a guide for land purchases and for contouring structural maps based on seismic and well data.

The survey was flown by Sander Geophysical Limited (SGL) of Kanata, Ontario. The data acquisition proceeded very smoothly and the final data quality was excellent. The area covered includes Twp 89 - 96, Rge 7 - 14 W5M, and it includes reflying the original Ogston Block in order to provide uniform coverage and avoid short profiles, which are not desirable for depth analysis. The line spacing was increased to 600 x 1824 m, based on analysis of the earlier data.

An early surprise was the detection of a field of presumed kimberlites, just beyond the borders of the original Ogston Block. Some of these anomalies were large enough to be detected during the field QC, and four additional infill lines were flown to confirm the position of the larger anomalies.

GEDCO went through an exhaustive review of the data and carefully edited out known cultural anomalies on each profile and then releveled the data. The result is a much cleaner final data set for analysis. In this case there are two "final" data sets - one which has the presumed kimberlite anomalies (hereafter referred to as "pipe anomalies") included, and one in which the pipe anomalies have been edited out. This decision was made to facilitate interpretation of other features and to preserve the option of keeping the existence of the pipe anomalies highly confidential for an extended period of time. One map was made which highlights just the pipe anomalies.

GEDCO used band pass filtering to highlight features of interest. The most useful filter for the Ogston area was the first vertical derivative (1VD) of the 1.1 - 3.8 km band pass to image the deeper sedimentary section and the uppermost magnetic basement. A second useful presentation is the 1VD of the horizontal derivative. This map highlights edges, and it seems to provide the most detailed perspective of the structural grain. A 1.5 - 4 km band pass map without shaded relief gives a different perspective of the data. Maps at 1:100,000 of these filtered versions of the data are included with this report. A longer wavelength (3 - 6 km band pass) map was used in the interpretation to look at deeper features within the basement.

GEDCO used MAGPROBE™ to estimate the depths to magnetic sources using a wide variety of magnetic depth estimation techniques. An interpretation map at 1:100,000 summarizes the intra-sedimentary and basement faults which are magnetized. Several wrench zones are evident, including

Introduction

The East Peace River Arch High Resolution AeroMagnetic (HRAM) survey was flown in February-March, 1995. A previous pilot project over the Ogston Block and Golden West areas had proved quite successful as a template to test the applicability of high resolution aeromagnetic surveying to exploration over the faulted basement in the area of the eastern Peace River Arch. This survey was designed to extend the coverage to the north, west and east to cover areas with potential for extending the successful Ogston play.

The primary objective was to develop a comprehensive interpretation of the basement structural grain in order to use as a guide for land purchases and for contouring structural maps based on seismic and well data.

In a regional sense, the survey area lies in the Buffalo Head Terrane, just west of an area where there is no magnetic data available in the public domain. Figure 1 is a portion of a shaded relief magnetic map produced by the Geological Survey of Canada (GSC) from a composite of many surveys. The positions of the current survey and of the previous Ogston and Golden West surveys are indicated. For a more complete discussion of the terranes of Western Canada, see Chapter 4 (written by Gerry Ross and others) of the Geological Atlas of the Western Canada Basin (1994) and the references given therein. In particular GSC Bulletin 447 (Villeneuve et al., 1993), entitled "Tectonic Subdivision and U-Pb Geochronology of the crystalline basement of the Alberta Basin, Western Canada", is a good, detailed discussion of the subject.

Survey Specifications and Processing

The acquisition aircraft was a twin engine Beechcraft with Canadian registration C-FWZG, fitted with a stinger-mounted, Scintrex CS-2 optically pumped, cesium vapour, split beam magnetometer. The magnetic sample interval of .1 second is equivalent to a sample interval on the ground of less than 10 m. Navigation was done using differential Global Positioning Satellite (GPS) data, with horizontal accuracy of better than 10 m, at a update rate of once per second in the cockpit. A diurnal base station was maintained to insure that data were not acquired during magnetically noisy periods. The data were adjusted by the contractor to correct for diurnal variations.

Data were processed in the field as the survey proceeded. Data processing included diurnal correction and correction for the International Geomagnetic Reference Field (IGRF). The diurnal correction was done by subtracting the time-annotated ground station data from the measured profiles and then adding back in a survey-averaged value for the ground station. For the IGRF correction, the IGRF value was calculated for each point in the survey according to the plane's position at the time of measurement. This value (function of x,y,z,t) was subtracted from the diurnally corrected data, and then a survey-average IGRF value was

added back in.

The survey covers Twp 89 - 96, Rge 7 -14 W5M. It was flown with traverse lines oriented E/W at 600 m line spacing and tie lines oriented N/S at 1824 m line spacing. The line spacing was chosen by replotting the previous Ogston survey using every second and every third line. There was no significant degradation in resolution using every second line, and there was loss of detail when only every third line was used. The orientation of the traverse lines was changed to E/W in order to avoid having short profiles which are not suitable for depth analysis.

The original Ogston Block was flown again on this survey as there was no significant cost savings to leaving it out because of operational complications. Also, leaving it out would have created many problems with the depth interpretation because of varying line lengths and different line orientations. As an added benefit, this additional coverage also provides the opportunity to compare the results of the two surveys.

The survey altitude was nominally 120 m above ground (drape flying), controlled by barometric and radar altimeters. The actual average survey height was 121.8 m, with a ground clearance range of 81 - 213 m (Plate 2). The higher ground clearances are associated with steep valleys (particularly the Wabasca River) or the slopes of the Buffalo Head Hills, whose eastern front runs roughly north-south through the survey area (see Plate 3). One of the important quality control checks on an aeromagnetic survey is the smoothness of the drape surface which was flown by the pilot. Plate 4 shows the post-processed elevation of the aircraft, based on the vertical channel of the GPS (which has an accuracy of about 5 m). There are some places where the line orientation is evident, but in general the elevation control of the pilot was very good.

Preliminary data were provided within a few days after the end of the survey, and the final leveled data were shipped to Calgary in March, 1995, for cultural editing and interpretation by GEDCO.

The raw total field magnetic data as supplied by SGL is shown on Plate 1.

SGL provided the client with a detailed survey report (dated July, 1995) which contains detailed descriptions of the acquisition operations.

A-957

OPERATIONS REPORT

UTIKUMA LAKE PROJECT
HIGH RESOLUTION AEROMAG SURVEY

NORTH CENTRAL ALBERTA

for

SPECTRA EXPLORATION GEOSCIENCE CORP.

by

TERRAQUEST LTD.
Toronto, Canada

July 17, 1997

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1.0 INTRODUCTION

This report describes the specifications and operations of an airborne geophysical survey carried out for SPECTRA EXPLORATION GEOSCIENCE CORP. Suite 2610, 520 - 5th Avenue, Calgary, AB, T2P 3R7. The survey was performed by TERRAQUEST LTD., 100-1373 Queen Victoria Avenue, Mississauga, ON, L5H 3H2, telephone (905)274-1795 and fax (905)274-3936.

The purpose of a survey of this type is acquire high resolution, high sensitivity aeromagnetic data in order to map both the near surface and basement rocks and structures in the survey area according to their magnetic signatures.

To achieve this purpose the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines spaced at even intervals, 120 metres above the terrain surface, and aligned so as to intersect the regional geology and structure in a way to provide the optimum contour patterns of geophysical data.

2.0 SURVEY AREA

The survey area is located in central northern Alberta, east of the town of Peace River, and stretches from south of Lesser Slave Lake to north of the 23rd baseline. The town of Slave Lake is in the southeast quadrant and High Prairie in the southwest quadrant. Access to the survey area is excellent in the south and moderate to the north; highways and roads include #33, #2, #88, #750, #754 and #686.

The survey area is rectangular in shape from latitude N55° 01.2' to N56° 51.5' and longitude W114° 18' to W116° 53'. This covers townships 70 to 90 and ranges 3 to 18, W5M inclusive. The N.T.S. references are 83O/1-16, 83N/1,2,7,8,9,10,15,16, 84B/1-16 and 84C/1,2,7,8,9,10,15,16. The survey covers approximately 32,000 square kilometres.

3.0 EQUIPMENT SPECIFICATIONS

3.1 AIRCRAFT

The survey was carried out using three aircraft as follows:

1) Navajo PA-31 registration C-GPVN
2) Navajo PA-31 registration C-GXKS
3) Cessna U206 registration C-GGLS

These aircraft are referred to as 1), 2) and 3) respectively throughout this report. They have been extensively modified for airborne geophysical survey applications. Considerable effort has been made to remove all ferruginous materials near the sensors and to ensure that the aircraft electrical systems do not create any noise. All aircraft have a Figure of Merit less than 1.5 nT compensated using G.S.C. standards.

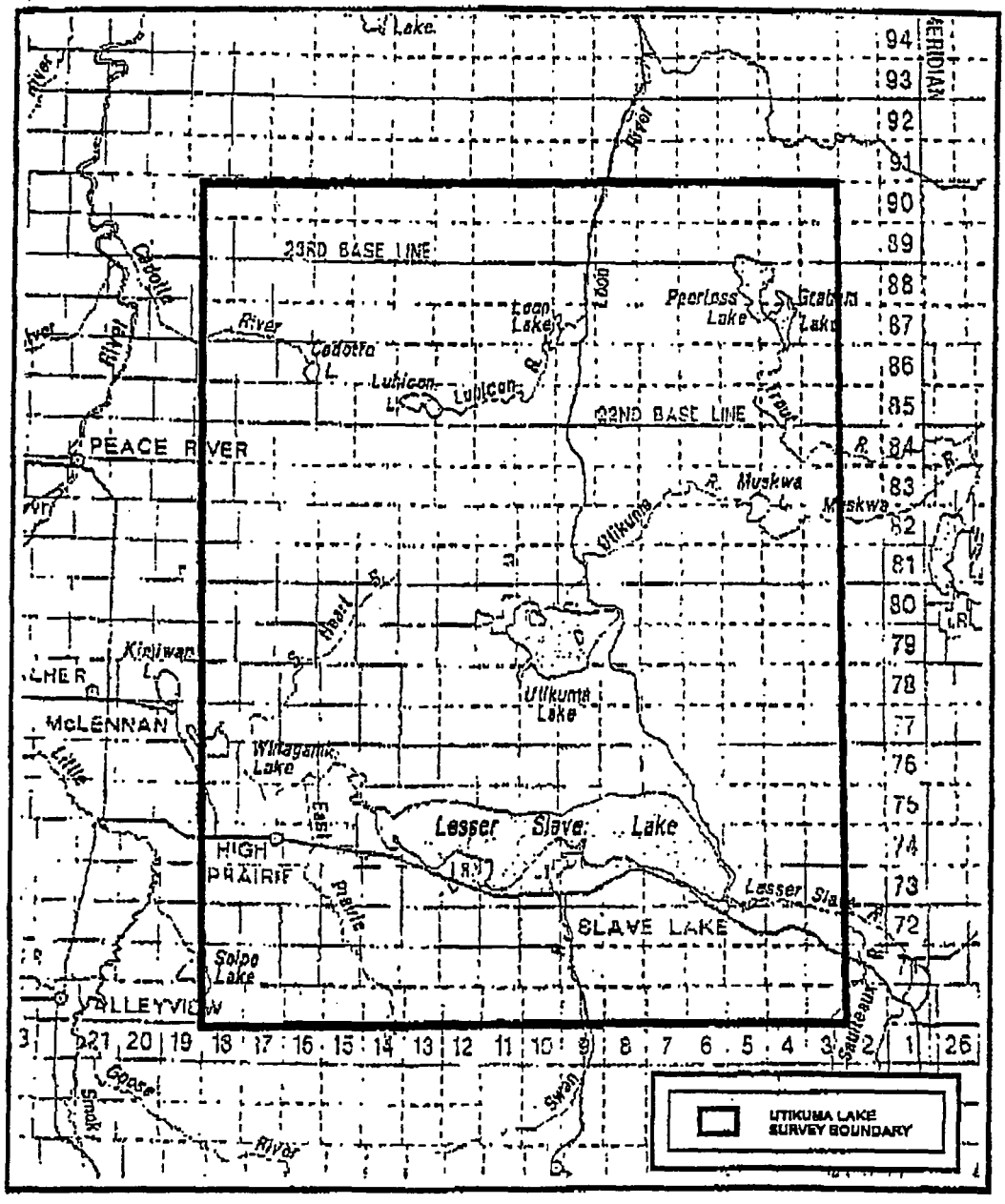


FIGURE 1. SURVEY LOCATION MAP

Aircraft 1) above is owned and operated by Brucelandair and maintained under contract through Phoenix Aviation. Aircraft 2) and 3) above are owned and operated by Terraquest Ltd. under full M.O.T approval and certification for specialty flying including airborne geophysical surveys. The aircraft is maintained at base of operations by a regulatory AMO facility, Leggat Aviation Inc. and in the field by a Terraquest Ltd. AME in association with an approved AMO.

3.2 AIRBORNE GEOPHYSICAL EQUIPMENT

All aircraft have a high sensitivity, cesium vapour magnetometer and similar data acquisition systems. 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 survey area with real time flight path. All data is collected and stored by the data acquisition system. The following provides the detailed equipment specifications.

Cesium Vapour Magnetometers (same on all aircraft):

Model	CS-2
Manufacturer	Scintrex
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

Video Camera (similar on all aircraft):

Models	VDC-2982 and VCC 3972 (colour)
Manufacturer	Sanyo
Specifications	1/2", 470hr, 1.3LX, 12VDC, C/CS, EI/ES, backlite comp
Lens	Rainbow, 2/3", 4.87 mm, F1.8-360, auto iris,

Video Recorder (mounted in rack):

<u>Aircraft #1 and #2</u>	
Model	16-409 8mm
Manufacturer	Memorex
<u>Aircraft #3</u>	
Model	AG 2400 NTSC (commercial grade)
Manufacturer	Panasonic

Radar Altimeter (same on all aircraft):

Model	KA-131
Manufacturer	King
Accuracy	5% up to 2,500 feet
Calibrate Accuracy	1%
Output	Analogue for pilot; Converted to digital for data acquisition

Barometric Altimeter (same on all aircraft):

Model	LX18001AN
Manufacturer	Sensym
Source	Coupled to aircraft pitot static system

Differential GPS Receiver (same on all aircraft):

Model	GPS Card 3951R
Antenna	Model 511
Manufacturer	Novatel
Position Update	0.2 per second for navigation
Accuracy	position (SA implemented) 100 metres position (no SA) 30 m velocity 0.1 knot time recovery 1pps, 100 nsec pulse width
Data Recording	all GPS data and positional data logged by PDAS 1000

Navigation Interface (same on all aircraft):

Model	PNAV 2001
Manufacturer	Picodas Group Inc.
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 PDAS 1000

Data Acquisition System:

Aircraft #2 and #3

Model	PDAS 1000
Manufacturer	Picodas Group Inc.
Operating System	MS-DOS
Microprocessor	80486dx - 66 CPU
Coprocessor	Intel 80486dx
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

Aircraft #1

Model	P101
Manufacturer	Picodas Group Inc.
Chassis	Passive back plane, plug in card slots
Operating System	MS-DOS
Microprocessor	80486dx - 66 CPU
Coprocessor	Intel 80486dx
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	LCD
Graphic Display	Remote VGA, LCD, with keypads, scrolling analog chart simulation with up to 6 windows operator selectable; freeze display capability to hold image for inspection
Recording Media	Standard hard disk with extra shock mounts
Sampling	Selectable for each input type; 1, 0.5, 0.25, 0.2 or 0.1 seconds
Inputs	8 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 data acquisition systems also contain the magnetometer processor boards:

Model	PCB
Manufacturer	Picodas Group Inc.
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>1KOhm

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.

Other Boards:

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) PC6B converter to convert the 13.75 volt aircraft power to 27.5 volts DC. In aircraft 3)
2) Power Distribution Unit manufactured by Picodas Group Inc. located in the instrument rack interfaces with the aircraft power and provides filtered and continuous power at 13.75 and 27.5 vDC to all rack components for aircraft #2 and #3.
3) The PDAS-1000A contains a 32 volt DC cesium sensor switching power supply for the cesium vapour 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); aircraft #2 and #3.
4) Power for system on Aircraft #1 came directly from the aircraft and was buffered by a large capacitor.

3.3 MAGNETIC BASE STATION

High sensitivity base station data is provided by a cesium vapour magnetometer, data logging onto a PC 386sx notebook and time synchronization with ground GPS receiver.

Magnetic Sensor:

Model	VIW 2321 H-8, cesium vapour
Manufacturer	Scintrex
Serial Number	8801101
Resolution	0.001 nT counting @ 0.1 per second
Sensitivity	+/- 0.005 nT
Dynamic Range	20,000 to 100,000 nT
Fourth Difference	0.02 nT

Magnetic Processor:

Model	MEP-710
Manufacturer	Picodas Group Inc.
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 > 1 KOhm
Clock Stability	2 ppm per year

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

The ground GPS base station equipment was identical to the GPS receiver and antenna used in the aircraft (see above for specifications). The data was logged onto a 486dx notebook computer. Ground GPS data was collected to perform post flight differential correction to the flight path.

3.5 IN-FIELD COMPUTING FACILITIES

The following equipment were supplied for infield preliminary processing including base station logging, GPS differential calculations and analogues of data on fanfold paper;

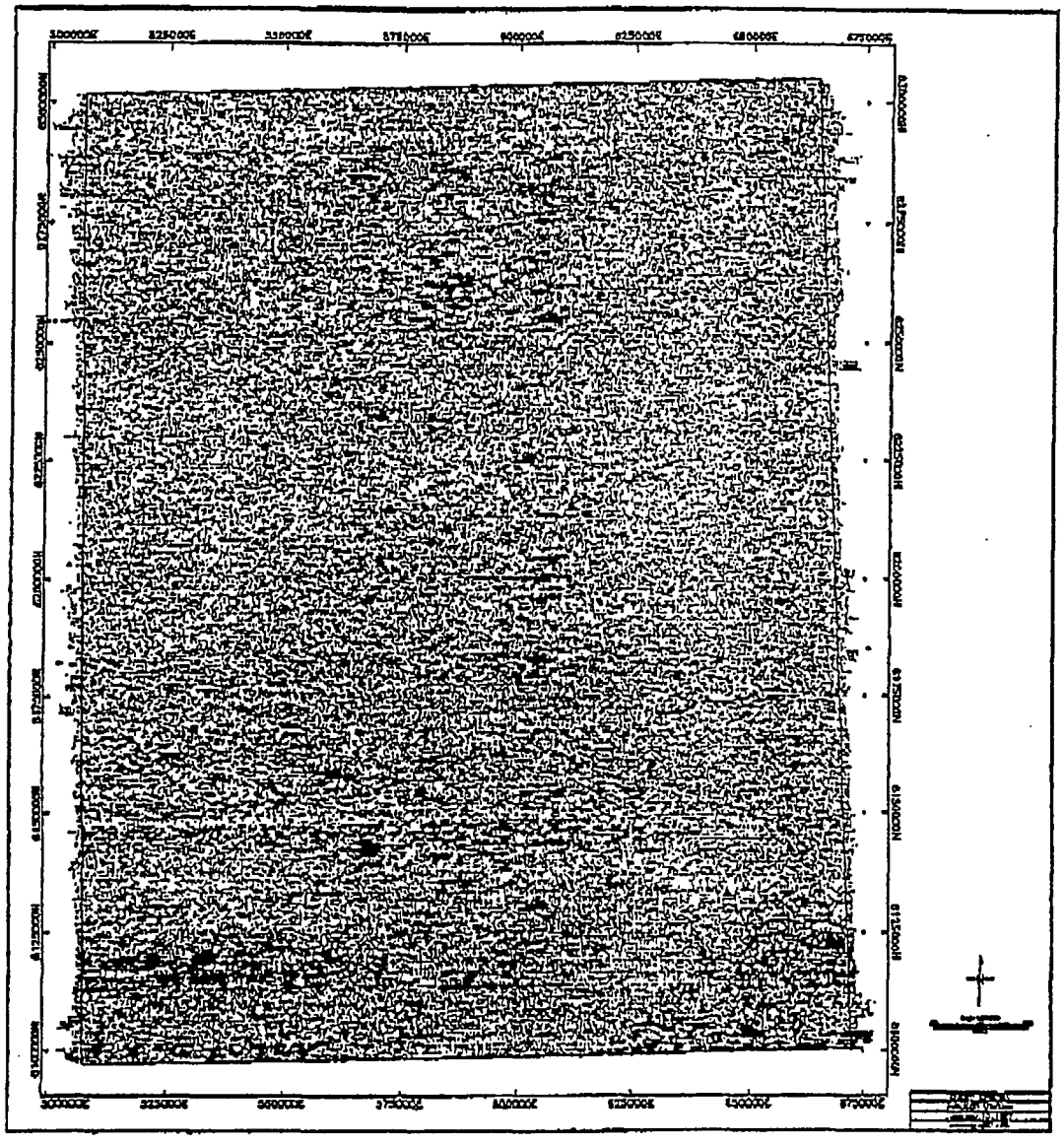
- desktop Pentium 133, 32 MB memory, 2GB HD, Colorado tape drive, CD-ROM writer,
- external Exabyte tape drive
- notebooks Pentium 100, 486DX/66 and two 386's
- one colour and two black and white printers

Software included C3NAV by Picodas Group Inc for GPS differential corrections, OASIS suite of software by Geosoft Inc. to provide binary database functions, tie line levelling, mapping and imaging.

4.0 SURVEY SPECIFICATIONS

4.1 LINES AND DATA

Survey area coverage	350 survey lines	55,958 km
	94 tie lines	18,915 km
	total	74,873 km
Line direction	090/270 degrees azimuth, lat/long mode	
Line interval	600 metres	
Tie direction	000/180 degrees azimuth, lat/long mode	
Tie line interval	1,772 metres	
Terrain clearance	120 metres, drape mode	
Average ground speed	80 metres/second	
Data point interval:	8 metres	



TERRAIN CLEARANCE - RADAR ALTIMETER

TOTAL MAGNETIC FIELD

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 spikes and linearly interpolate gaps.
8) Edit RAWMAG channel (compensated tail magnetometer referred to as CMAG3 in aircraft Picodas format) to remove any spikes and linearly interpolate gaps
9) Create new channel as RMAGDC = RAWMAG - GNDMAG + base constant
10) Perform lag correction to RMAGDC channel; lag is 0.6 seconds
11) Perform tie line levelling by using all the survey line data to level the tie lines
12) Perform survey line levelling using the levelled tie lines; final levelled channel is labelled LEVMAGDC
13) All data were viewed on the screen on a line by line basis using the interactive OASIS database to inspect for quality, required tolerances and data integrity.
14) Produce preliminary flight path map, colour magnetic intensity map including shadowing, and first vertical derivative map and send to client. The data from the tie lines were available first, in the early part of the survey and permitted the client to get an overview of the survey area at 2.4 km line intervals.
15) Plot analog charts of RAWMAG and MAGDC in requested format, inspect for data quality and ship along with digital data and video tapes to client for approval.

Following de-mobilization, the data were shipped to the Terraquest processing office for final processing by Dr. Shuchun (Harry) Du. These processing steps were as follows:

1) Plot survey line and tie line flight paths and profiles for quality control inspection.
2) Prepare grid of final field levelled tie line data and shadow it at low sun angle to check quality of tie line co-levelling.
3) Prepare grid of final field levelled survey line data, shadow it at low sun angle and calculate a horizontal gradient grid, both used to check the quality of tie line level corrections.
4) In OASIS inspect raw, diurnal corrected, and final levelled mag simultaneously on each line to determine cause of any poor tie line levelling.
5) Eliminate tie/survey intersections that are not usable due to excessive tie line diurnal noise and/or culture.
6) Eliminate duplicated data from reflights if required.
7) Prepare new levelling correction table and apply it.
8) Repeat steps 3) to 6) as often as is necessary to achieve highest quality data set.
9) Normally the noise and/or culture that interferes with the final product is filtered or edited; however in this case neither were performed as requested in contract.
10) Micro-level final total field grid to remove small line level errors (this was not done in this survey since cultural affects were edited out by client).
11) Contour data.
12) Final processed data, plot files and grids archived on Exabyte tape

6.0 SUMMARY

An airborne high sensitivity, high resolution magnetic survey has been carried out at 120 metre terrain clearance, 600 metre line intervals and with data sample stations at 8 metres along the lines. Ties lines were spaced at 1.8 kilometres or less. 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 a compensated magnetometer, radar altimeter, barometric altimeter and all attendant GPS data. The magnetic data have been processed and gridded with a 200 metre grid cell size. Cultural effects have not been filtered or edited out. Micro-levelling (decorrugation) and filtering have not been performed on the data.

TERRAQUEST LTD.

Charles O. Barrie, M.Sc.

GEOLOGICAL ASSOCIATION OF CANADA
CHARLES O. BARRIE
FELLOW

APPENDIX III

UTIKUMA PROJECT (A957)

Tie Lines

Line flown by PVN	Line flown by NKS	Line flown by GLS
Tie 5000 -- Tie 5700	Tie 5710 -- 5850	None
Tie 5860	Tie 5861	
Tie 5870	Tie 5890	
Tie 5880	Tie 5910	
Tie 5891		
Tie 5900		

Survey Lines

Line flown by PVN	Line flown by NKS	Line flown by GLS
Line 10 --> 80	Line 90 --> 210	Line 221
Line 840 --> 1020	Line 230 -- 780	Line 790
Line 1030 --> 1520	Line 800 --> 830	Line 1021
Line 1530 --> 1710	Line 1720 --> 1770	Line 1521
Line 780	Line 1790 --> 1900	Line 1901
Line 2120. 2170	Line 1911 --> 1990	Line 2001 --> 2051
Line 2190 --> 2600	Line 2060	Line 2071 --> 2101
Line 2610 --> 2680	Line 2110	Line 2151
Line 2690 --> 2710	Line 2130 --> 2140	Line 2160
Line 2720 --> 2810	Line 2820 --> 2840	Line 2180
Line 2850	Line 2860	Line 2601
Line 2870 --> 3150	Line 3280 --> 3310	Line 2681
Line 3160 --> 3250	Line 3360 --> 3400	Line 2711
Line 3320 --> 3330		Line 3151
Line 3410		Line 3261 --> 3270
		Line 3340 --> 3350
		line 3420

A-976

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UNTIL

OPERATIONS REPORT

RED EARTH PROJECT

HIGH RESOLUTION AEROMAGNETIC SURVEY

ALBERTA

for

ASHTON MINING OF CANADA INC.

by

TERRAQUEST LTD.
Toronto, Canada

January 20, 1998

TABLE OF CONTENTS

1.0 INTRODUCTION

This report describes the specifications and operations of an airborne geophysical survey carried out for ASHTON MINING OF CANADA INC., Unit 123, 930 West 1st Street, North Vancouver, BC, V7P 3N4. The survey was performed by TERRAQUEST LTD., 100-1373 Queen Victoria Avenue, Mississauga, ON, L5H 3H2, telephone (905)274-1795 and fax (905)274-3936.

The purpose of a survey of this type is acquire high resolution, high sensitivity aeromagnetic data in order to map both the near surface and basement rocks and structures in the survey area to guide exploration for kimberlites.

To achieve this purpose the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines spaced at even intervals, 80 metres above the terrain surface, and aligned so as to intersect the regional geology and structure in a way to provide the optimum contour patterns of geophysical data.

2.0 SURVEY AREA

The survey area is located in north central Alberta, in the Buffalo Head Hills area, just north of the settlement of Red Earth. The survey area covers 64 townships (townships 88 to 95 and ranges 7 to 14), or approximately 6,080 square kilometres. Route #88 passes through the eastern side.

The boundary latitude and longitude coordinates are 56 degrees 35 minutes to 57 degrees 18 minutes north, and 114 degrees 57 minutes to 116 degrees 17.5 minutes west. The N.T.S. references are 84B/11,12,13,14,84C/9,16, 84F/1,8, 84G/3,4,5 and 6.

3.0 EQUIPMENT SPECIFICATIONS

3.1 AIRCRAFT

The survey was carried out using a Cessna 206 aircraft, registration C-GGLS, which carries a high sensitivity magnetometer. It is equipped with long range tanks, outboard tanks (total 9 hours range), balloon tires, cargo door and full avionics.

The aircraft has been extensively modified to support a tail stinger and two wing tip extensions. The transverse separation between the wing tip magnetic sensors is 7.5 metres and the longitudinal separation to the tail sensor is 7.2 metres. Considerable effort has been made to remove all ferruginous materials near the sensors and to ensure that the aircraft electrical system does 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 9 nT uncompensated and 1.22 nT compensated at this survey location using G.S.C. standards.

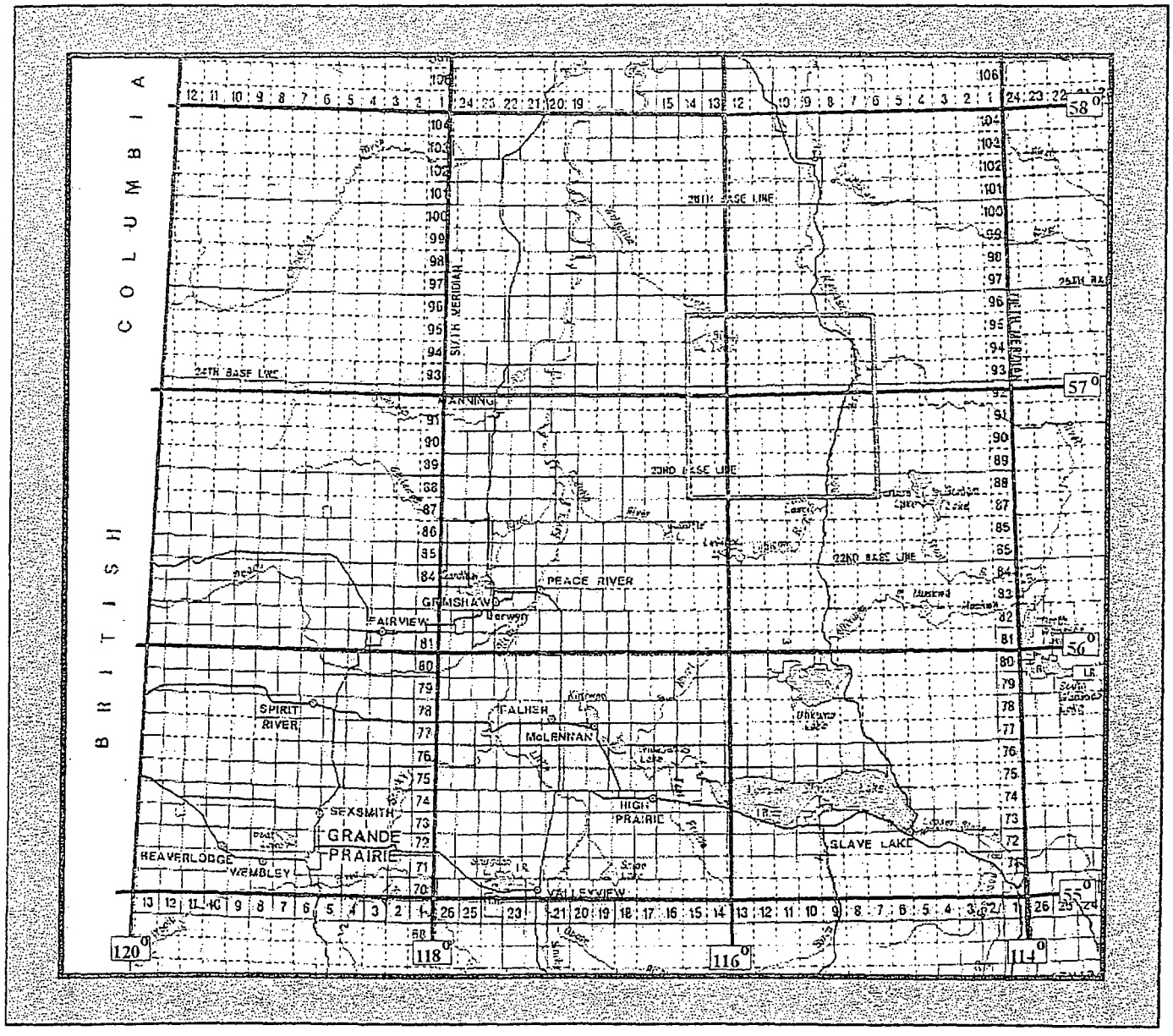

FIGURE 1. SURVEY AREA LOCATION MAP

The aircraft is owned and operated by Terraquest Ltd. under full M.O.T approval and certification for specialty flying including airborne geophysical surveys. The aircraft is maintained at base of operations by a regulatory AMO facility, Leggat Aviation Inc. and in the field by a Terraquest Ltd. AME in association with an approved AMO.

3.2 AIRBORNE GEOPHYSICAL EQUIPMENT

The airborne geophysical system has three high sensitivity, cesium vapour magnetometers. 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 survey area with real time flight path. All data is collected and stored by the data acquisition system. The following provides the detailed equipment specifications.

Cesium Vapour Magnetometers:

Model	CS-2
Manufacturer	Scintrex
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 tail stinger):

Model	MAG-03MC
Manufacturer	Bartington Instruments Ltd.
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%

Video Camera (camera mounted in belly of aircraft):

Model	VDC-2982 (colour)
Manufacturer	Sanyo
Serial Number	698000-30
Specifications	1/2", 470hr, 1.3LX, 12VDC, C/CS, EI/ES, backlite comp
Lens	Rainbow, 2/3", 4.87 mm, F1.8-360, auto iris,

Video Recorder (mounted in rack):

Model	AG 2400 (commercial grade)
Manufacturer	Panasonic
Serial Number	C8TA00281

Radar Altimeter:

Model	KA-131
Manufacturer	King
Serial Number	071-1114-00
Accuracy	5% up to 2,500 feet
Calibrate Accuracy	1%
Output	Analogue for pilot; Converted to digital for data acquisition

Barometric Altimeter:

Model	LX18001AN
Manufacturer	Sensym
Source	Coupled to aircraft pitot static system

Navigation Interface (mounted in rack with pilot and operator readouts):

Model	PNAV 2001
Manufacturer	Picodas Group Inc.
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 PDAS 1000

Data Acquisition System (mounted in rack):

Model	PDAS 1000
Manufacturer	Picodas Group Inc.
Operating System	MS-DOS
Microprocessor	80486dx - 66 CPU
Coprocessor	Intel 80486dx
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 PDAS 1000 also contains the magnetometer processor boards, one for each cesium vapour magnetometer:

Model	PCB
Manufacturer	Picodas Group Inc.
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>1KOhm

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.

Other Boards:

1) Differential GPS Receiver:

Model	GPS Card 3951
Manufacturer	Novatel
Antenna	Model 511
Position Update	0.2 second for navigation
Accuracy	position (SA implemented) 100 metres position (no SA) 30 m velocity 0.1 knot time recovery 1pps, 100 nsec pulse width
Data Recording	all GPS data and positional data logged by PDAS1000

2) 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) PC6B converter to convert the 13.75 volt aircraft power to 27.5 volts DC.
2) Power Distribution Unit manufactured by Picodas Group Inc. located in the instrument rack interfaces with the aircraft power and provides filtered and continuous power at 13.75 and 27.5 vDC to all rack components.
3) The PDAS-1000A contains three 32 volt DC cesium sensor switching power supplies for the cesium vapour 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.

3.3 MAGNETIC BASE STATION

High sensitivity base station data are provided by a cesium vapour magnetometer, data logging onto a PC 386sx notebook and time synchronization with ground GPS receiver.

Magnetic Sensor:

identical to magnetometer in aircraft

Magnetic Processor:

Model	MEP-710
Manufacturer	Picodas Group Inc.
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.

3.4 GPS BASE STATION

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

Model	MX 4200D
Manufacturer	Magnavox
Serial Number	5057
Type	Continuous tracking, L1 freq., C/A code (SPS), 6 channel (independent)
Receiver Sensitivity	-143 dBm Costas threshold
Position Update	once per second
Accuracy	with SA implemented 100 metres, no SA 30 metres, velocity 0.1 knot, time recovery 1pps, 100 nsec pulse width

3.5 IN-FIELD COMPUTING FACILITIES

The following equipment were supplied for infield preliminary processing including base station logging and GPS differential calculations:

- two 486DX/66 and two 386SX/25 notebooks, External Colorado tape drive
- one colour and two black and white printers
- pentium notebook for processing database, data transmittal

Software included C3NAV by Picodas Group Inc for GPS differential corrections, OASIS suite of software by Geosoft Inc. to provide binary database functions, tie line levelling, mapping and imaging.

A sample of the print out provided of the analogue data is shown in Figure 3.

4.0 SURVEY SPECIFICATIONS

4.1 LINES AND DATA

Survey area coverage	327 survey lines	26,323 km
	65 tie lines	5,325 km
	total	31,648 km
Line direction	360 degrees azimuth	
Line interval	250 metres	
Tie line direction	90 degrees azimuth	
Tie line interval	1.233 kilometres	
Terrain clearance	80 metres, drape mode	
Average ground speed	60 metres/second	
Data point interval	6 metres	

4.2 TOLERANCES

Line spacing: Any gaps wider than 15% of the nominal line spacing for a distance of more than 12 kilometres. Also at no point shall the traverse or control lines deviate more than +/- 150 metres from the pre-plot line locations.

Terrain clearance: In general the true flight altitude must be less than +/- 15 metres for a distance of over 5 kilometres from the norm drape level of the survey. This survey has specific requirements with regard altitude control; the critical element is the difference in altitude between the survey line and the control line, referred to as elevation misties. Generally the misties should be less than +/- 10 metres absolute although some deviation is allowable in more rugged terrain as follows: 90% must be less than +/- 10 metres, and 100% less than +/- 20 metres.

Diurnal magnetic variation: A maximum deviation of +/- 2.50 nT from a curvilinear mean within the time span required to acquire 9 line kilometres of data at the specified minimum sampling interval.

TERRAQUEST FLIGHT DATA PROFILE

CLIENT: ASHTON MINING INC.
PROJECT: RED EARTH (A976)
FLIGHT DATE: *July_01_1997*
FLIGHT NUMBER: *G932*
LINE NUMBER: *L30*
START/END FIDS:

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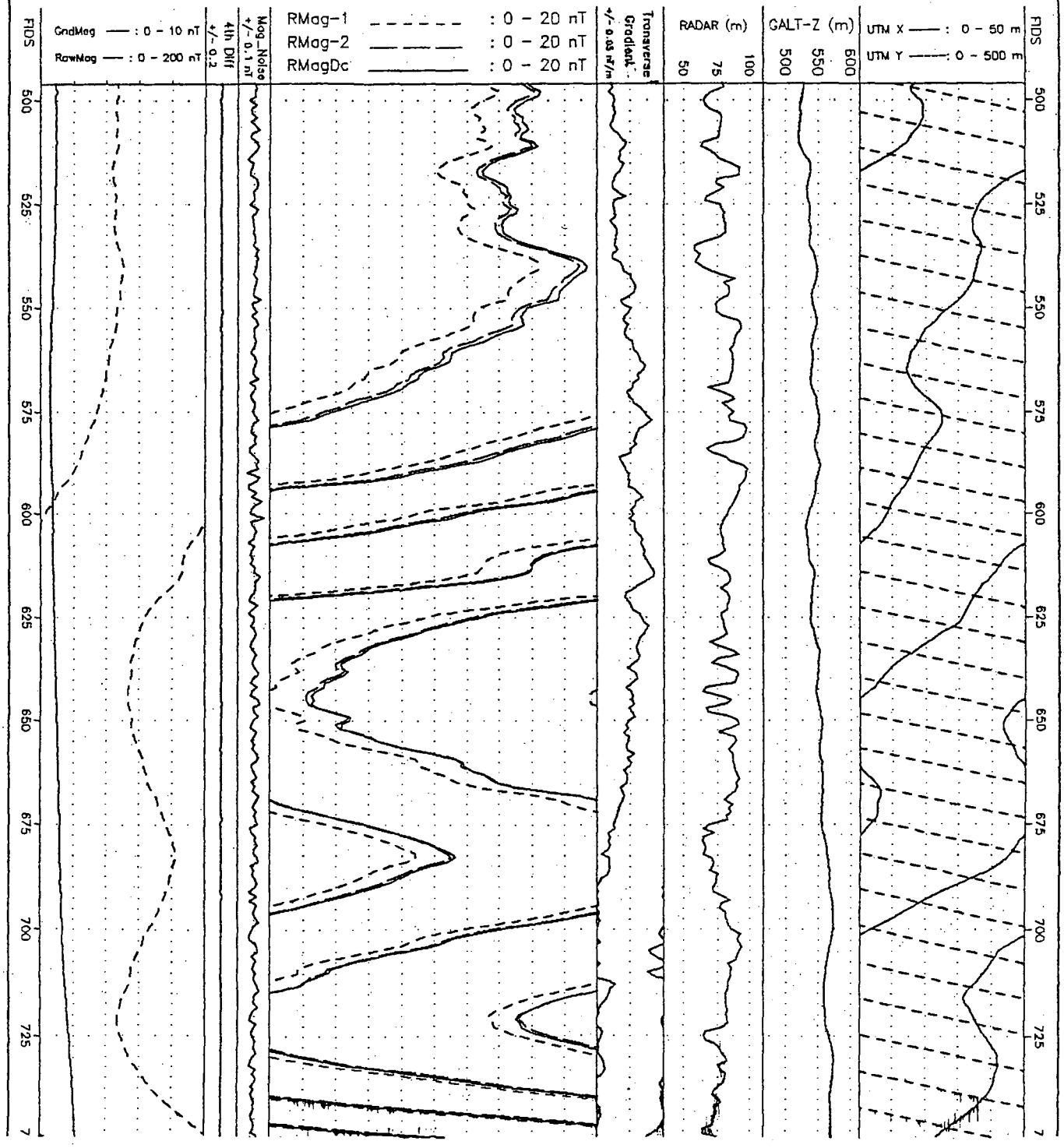
Notes: Mag_Noise = RMagDc – lpf (15 pts)



4.3 NAVIGATION AND RECOVERY

The satellite navigation system was used to ferry to the survey site and to survey along each line using latitude/longitude coordinates. The coordinates of the survey outline for navigation purposes and flight path recovery were supplied by the client.

The navigation accuracy is variable depending on the number and condition of the satellites, however it is generally less than twenty five metres and typically in the ten to fifteen metre 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 metres.

The navigational and flight path recovery positioning is based on the latitude and longitude of the corners provided. The datum shift from WGS84 to local is North American 1927, Canada, Clarke 1966 as follows: DX=10, DY=-158, DZ=-187.

A video camera recorded the ground image along the flight path. A video screen in the cockpit 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 with the base station magnetometer and GPS equipment was at the Peace River airport. The base stations were set up in a small shed belonging to Highland Helicopters at the far south western end of the airport complex. The exact coordinates of the GPS antenna were 56 degrees 56 minutes 55.66 seconds north and 117 degrees 37 minutes and 57.65 seconds west at an elevation of 457.8 metres above the Clarke 1866 datum.

Throughout most of the survey, the crew stayed in an apartment in Peace River; while surveying the eastern part of the grid, the flight crew stayed at a motel in Red Earth. Red Earth was also a convenient location for mid day refuelling. For this purpose, fuel was trucked in from the Slave Lake depot.

In-field data processing was performed by the field crew and encompassed downloading base station and aircraft data, applying differential GPS corrections, applying diurnal corrections, combining all data into a database. The data underwent preliminary examination on the screen to verify the data on a line by line basis. Each evening the data were transmitted via an FTP site to a Terraquest Ltd. geophysicist in Calgary who created flight path and geophysical images and inspected all the data. However, the quality control (QC) was subcontracted out by Ashton Mining of Canada Inc. to Spectra Exploration Geoscience Corp. of Calgary. Periodically throughout the survey, as sufficient data were obtained, the raw data were hand delivered to Spectra. Also, data were sent periodically to Don Fox (consultant to Ashton Mining) in Michigan either by direct FTP transmittal or CD-ROM by courier.

Prior to the survey, the aircraft was already configured as a three magnetometer aircraft, however at time of signing the contract, the wing tip sensors alone were not on the aircraft.

New matched magnetic sensor heads were installed, but a new bug in the manufacturer's software (only pertained to multi sensor configurations) delayed production to mid June.

The survey was flown by 84 flights (G914-G1052) over 107 days from June 16th to Sept 30th 1997. Of these, 26 days had two or more flights, 30 days had one flight (otherwise being restricted by diurnal or weather), 13 days had poor weather conditions, 13 days had out of specification magnetic diurnal conditions, 12 days had geophysical equipment downtime, 5 days had unscheduled aircraft maintenance, 4 days had scheduled aircraft maintenance, 3 days were used for calibration and testing, and 1 day near the end was spent waiting for QC results. The flight log is shown in Appendix I.

Approximately 2.5 weeks after the completion of the survey, Spectra Exploration Geoscience identified more reflights that had been missed in their earlier QC inspection. These were flown on 6 flights (G039-G052) between Oct 24 and Nov 04th 1997.

5.0 DATA PROCESSING

Preliminary processing was performed by a Terraquest Ltd. personnel, checking on all parameters and procedures, although the actual QC was performed independently by Spectra Exploration Geoscience Corp. The processing of the tail magnetic data 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 locations of the flight path.
2) Program C3NAV2TBL (by Geosoft) to produce two table files (UTM-X -Y -Z, and Lat/Lon)
3) Use BASEDUMP (Picodas) on raw binary base (diurnal) magnetic data to create GNDMAG table
4) Create jobfile database in MONTAJ (Geosoft) for airborne data and import corrected flight path and GNDMAG
5) Edit GNDMAG channel to remove any occasional spikes and linearly interpolate across the gaps. (Normally Terraquest filters the GNDMAG with a low pass filter to remove high frequency near surface and local disturbances; this was specifically requested not to be performed)
6) Establish table of mean terrain clearances at intersection locations from tie line data to provide elevation guidance for survey line navigation. Grid 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 spikes and linearly interpolate gaps.
8) Edit RAWMAG channel (compensated tail magnetometer referred to as CMAG3 in aircraft Picodas format) to remove any spikes and linearly interpolate gaps
9) Create new channel as RMAGDC = RAWMAG - GNDMAG + base constant
10) Perform lag correction to RMAGDC channel; lag is 0.6 seconds
11) Perform tie line levelling by using all the survey line data to level the tie lines
12) Perform survey line levelling using the levelled tie lines; channel labelled LEVMAGDC

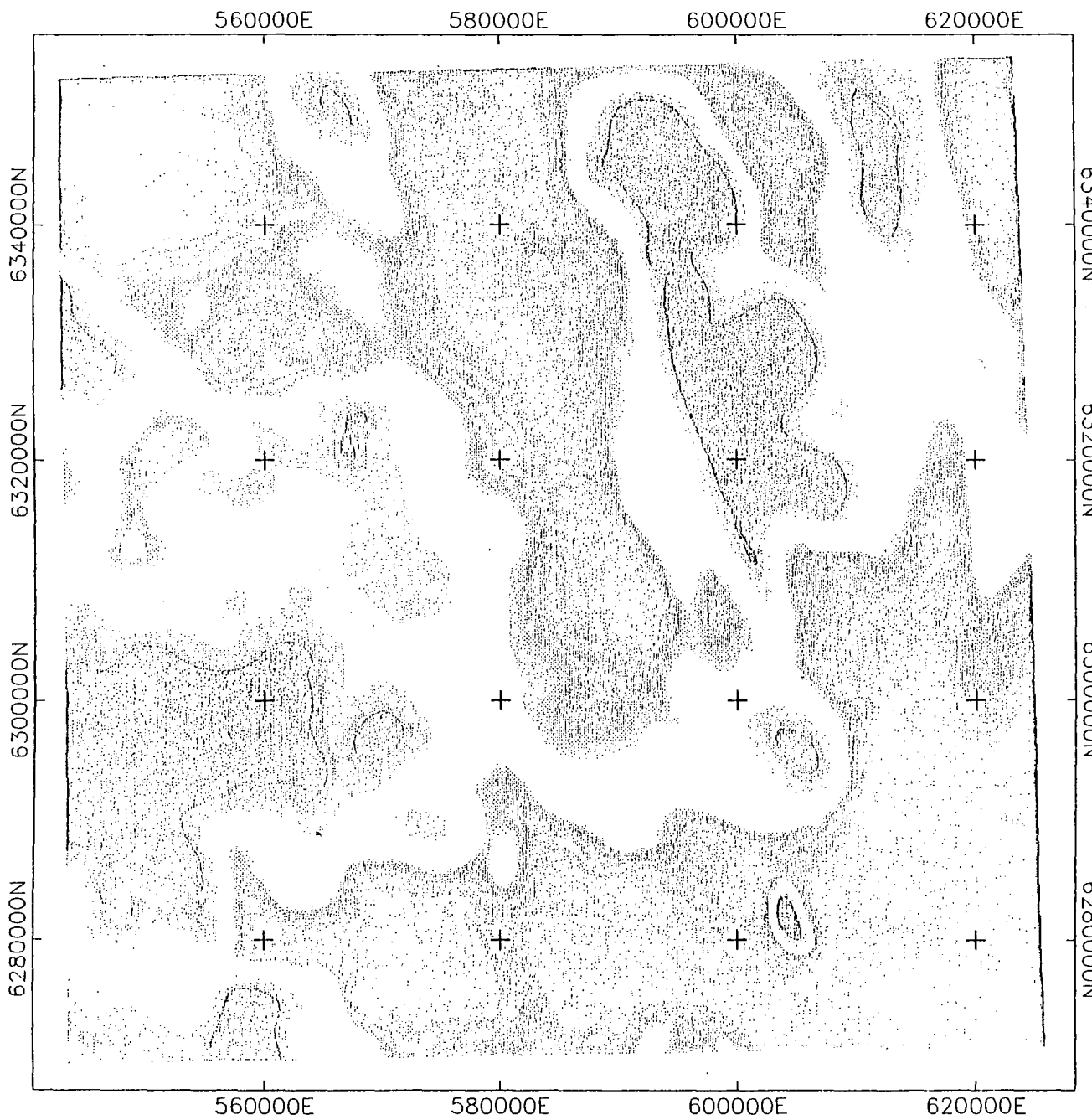
13) All data were viewed on the screen on a line by line basis using the interactive OASIS database
14) Produce preliminary flight path map and gridded magnetic intensity map including shadowing.
15) Plot analog charts of RAWMAG and MAGDC in requested format, inspect for data quality and ship along with digital data and video tapes to Spectra for approval.

Following quality control and de-mobilization, the data were subjected to more advanced level of processing and levelling as follows. The final microlevelling and inspection were carried out by a geophysicist in Calgary. These processing steps were as follows:

1) Plot survey line and tie line flight paths and profiles for quality control inspection.
2) Prepare grid of final field levelled tie line data and shadow it at low sun angle to check quality of tie line co-levelling.
3) Prepare grid of final field levelled survey line data, shadow it at low sun angle and calculate a horizontal gradient grid, both used to check the quality of tie line level corrections.
4) In MONTAJ inspect raw, diurnal corrected, and final levelled mag simultaneously on each line to determine cause of any poor tie line levelling.
5) Eliminate tie/survey intersections that are not usable due to excessive tie line diurnal noise and/or culture.
6) Eliminate duplicated data from reflights if required.
7) Prepare new levelling correction table and apply it.
8) Repeat steps 3) to 6) as often as is necessary to achieve highest quality data set.
9) Normally the noise and/or culture that interferes with the final product is filtered or edited; however in this case neither were performed as requested in contract.
10) Micro-level final total field grid to remove small line level errors.
11) Prepare Reduction to pole, and Vertical Gradient grids using 2D FFT operator on the Total Field grid. Note that all gridded products are based solely on the tail magnetometer and have a cell size of 60 metres.
12) Contour data
13) Prepare the Horizontal Gradient vectors from the measured data by 1) subtracting the wing tip sensors and dividing by their separation to get the transverse gradient, 2) subtract the value at two successive sample points and dividing by the separation (obtained from the velocity) to get the longitudinal gradient, and 3) combining the tranvsere and longitudinal gradients to obtain the horizontal gradient.
14) Digital images of well locations obtained from Geocad, Calgary
15) Data preliminary archived on CD-ROM
16) Data sent to Controlled Geophysicist Inc. for final inspection by senior geophysicist, merging with scanned topography, final plotting and final archiving on CD-ROM

The client's consulting geophysicist Don Fox was involved in all stages of the processing, with Terraquest Ltd., Controlled Geophysics Inc. and Spectra Exploration Geoscience Corp.

Grant, F. S. and Spector A., 1970: Statistical Models for Interpreting Aeromagnetic Data; Geophysics, Vol 35
Grant, F. S. 1972: Review of Data Processing and Interpretation Methods in Gravity and Magnetics; Geophy. 37-4
Spector, A., 1968: Spectral Analysis of Aeromagnetic maps; unpublished thesis; University of Toronto.



Scale 1:510907

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(metres)

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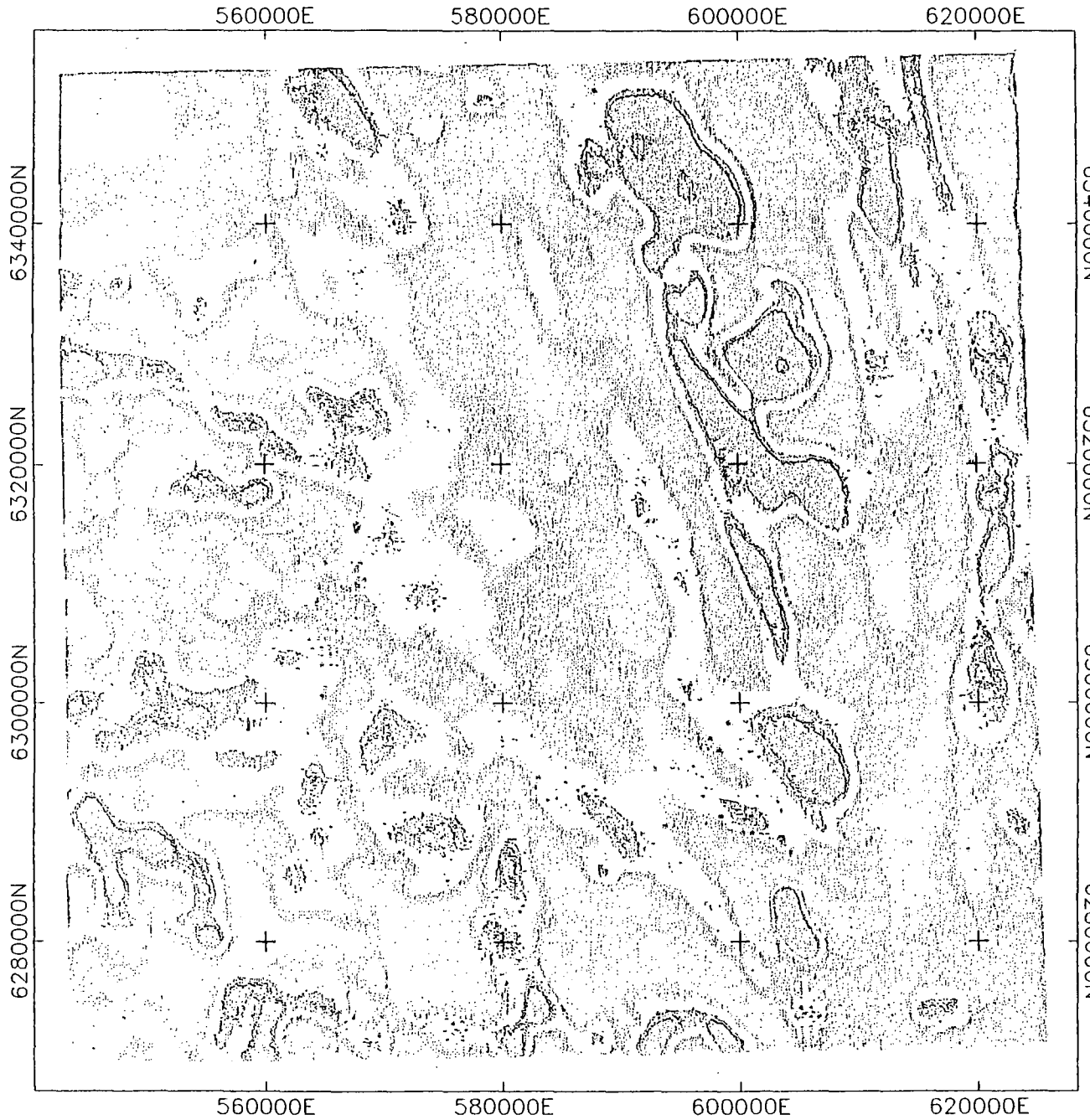
ASHTON MINING

TOTAL MAGNETIC FIELD
RED EARTH PROJECT

TERRAQUEST LTD.



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(metres)

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ASHTON MINING

VERTICAL DERIVATIVE
RED EARTH PROJECT

TERRAQUEST LTD.

The scale of the final plots is 1:100,000 as requested by the contract. As the survey was flown with 250 metre line interval and 80 metres mean terrain clearance, plus the data were processed and gridded at 60 metres grid cell size, this data set is significantly over processed at this plot scale; the data would be more useful at a scale of 1:25,000 or even 1:50,000. It is suitable for "zooming in" for detail on screen images. The plots provided are intended primarily for overview purposes.

6.0 HORIZONTAL GRADIENT

Although an interpretation was not requested by the client, the following comments are offered to assist in the interpretation of the horizontal gradient vectors since this product is not common place in the industry. Most of the experience obtained with horizontal gradiometry has been in Precambrian environments where the source bodies are at surface and with generally vertical orientation. Types of HG vector responses include the following:

1) point of convergence where the vectors point to the centre of small or point sources; sometimes edges of intrusives may appear as point sources
2) zone of divergence in the absence of a strong magnetic source, vectors rarely show divergence away from magnetic lows
3) flip-over where a sequence of vectors on one side of the flight line flip over to the other side of the flight line directly over the centre of the causative body which is at an angle to the flight line; this can be used to pinpoint precise centre or edge of magnetic body or structure
4) fence of vectors occur in response to larger bodies; fences on adjacent lines generally indicate deeper sources

Variations and combinations of these may occur. A few examples are outlined:

1) As the lateral distance between the aircraft and a pinpoint source increases, the degree of convergence decreases faster than the amplitude, for example, the flight line close to a pin point source would show strong convergence but the second flight line away would still show significant amplitude but probably little or no convergence (straight or parallel vectors)

2) Flip-overs only occur where the causative body is at least slightly oblique with the flight line; if it is at right angles, the transverse component will be insignificant.

3) A near surface, pinpoint source in the vicinity of a large and deeper source would be characterized by fence vectors with a local minor undulation in an otherwise uniform fence. This can be an effective tool in the identification of subtle near surface sources in regions of deeper-derived high gradients. Similarily, distortions in points of convergence or flip-overs may represent changes in orientation of the body or influences from more than one source. As with all potential field representations, the entire field with all its components and their interactions must be recognized.

This survey environment is characterized by four main sources as follows:

1) cultural sources at surface, characterized by variable amplitudes and very high frequency; HG vectors show very strong convergence and often large amplitude
2) kimberlite sources at surface, characterized by moderate to high amplitude and frequencies; HG vectors generally converge on edges or centre depending on size; often detected on several lines
3) geologic sources within the sedimentary basin, including concentrations of iron rich sediments and dikes, characterized by moderate total field amplitudes, the HG vectors occur over many lines with the appearance of several rows of "fences" which sworl toward the source (in previous surveys the HG component apppeared to have a detection limit of 200-300 metres, however it appears to be greater in this survey)
4) geologic sources from the deep basement, characterized by large total field amplitudes and probably little or no HG component.

Correlation of the known digital well locations with the horizontal gradient is excellent; the vectors converge precisely on the well location. This contrasts with the gridded contour data which only show the general area and do not specify which side of the flight line they occur. The confidence obtained from this correlation can be extended to similar vector responses to identify other cultural sources (bridges, dumps, vehicles etc. especially where they are out-of-sight of the video image. This technique should be used to ease the burden of deculturing the main data set.

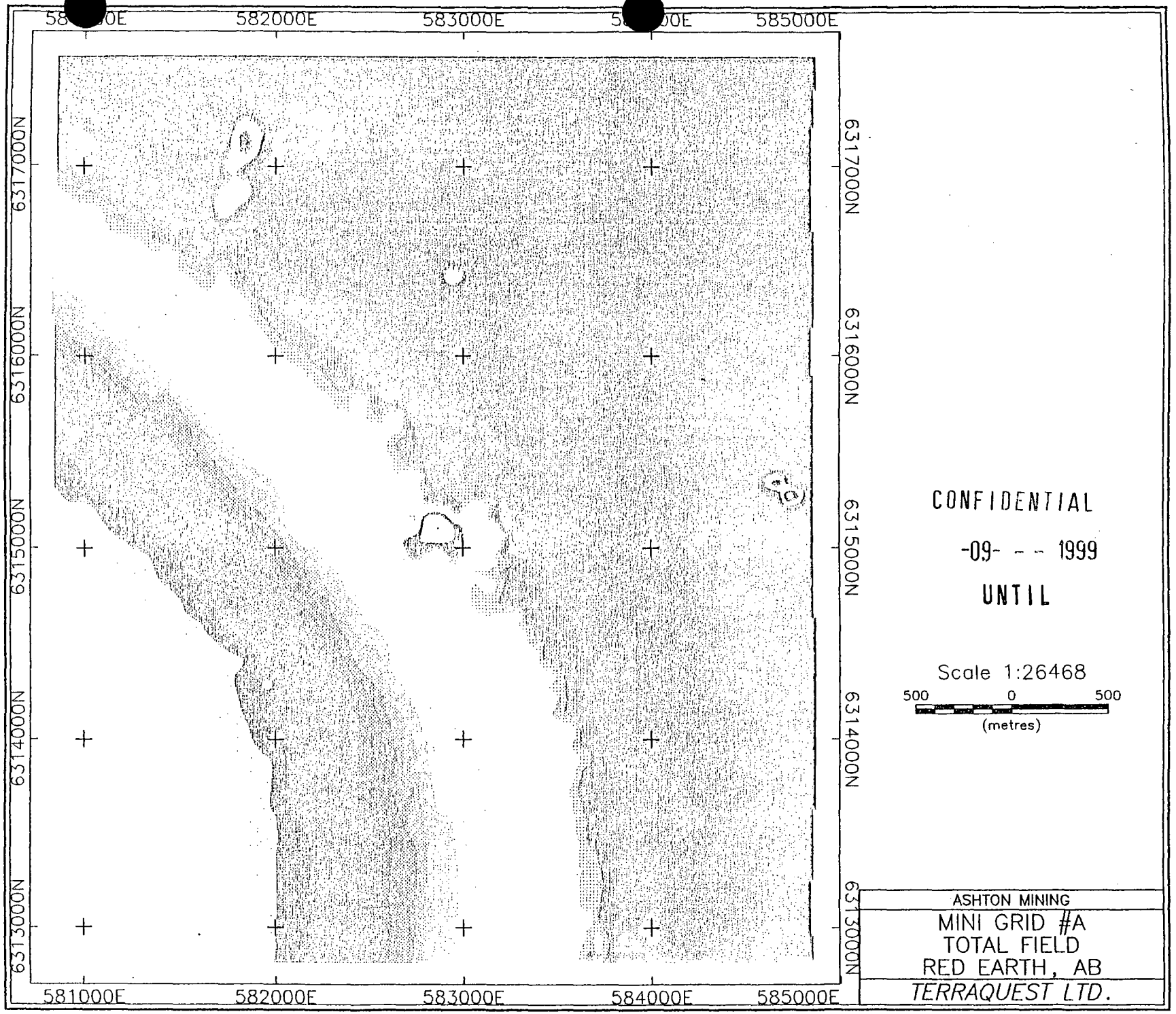
7.0 MINI-GRIDS

After the main part of the survey was completed, Terraquest offered and provided at no cost, data over three mini-grids over small areas of interest, with lines flown with 100 metre line intervals and at a lower mean terrain clearance of aproximately 30 metres. Don Fox provided the coordinates of three areas and the data were shipped directly to Don Fox. The purpose was twofold:

1) to demonstrate the effectiveness of tight line spacing, lower terrain clearance and the horizontal gradient vectors, and
2) the capability and cost effectiveness of light, long range fixed-wing aircraft to perform detailed mini-grids at low altitude (elsewhere a survey was flown over a group of smaller grids spread out over 400 kilometres, with the closest being over 120 km from the base)

Grid A is a relatively "large" mini grid that covers several targets; the total field is presented here as an overview. Within this grid, a zoom-in is shown of the main, central target (Grid A-1) with excellent detail being provided by both the vertical derivative and the measured horizontal gradient. The horizontal gradient vectors resolve significantly extra detail within the centre of the anomaly. This should be verified on the ground prior to drilling.

Mini Grid B covers an arcuate shaped anomaly. The contours of the gridded vertical gradient data show the general trend with far more detail than the zoomed-in part of the main survey.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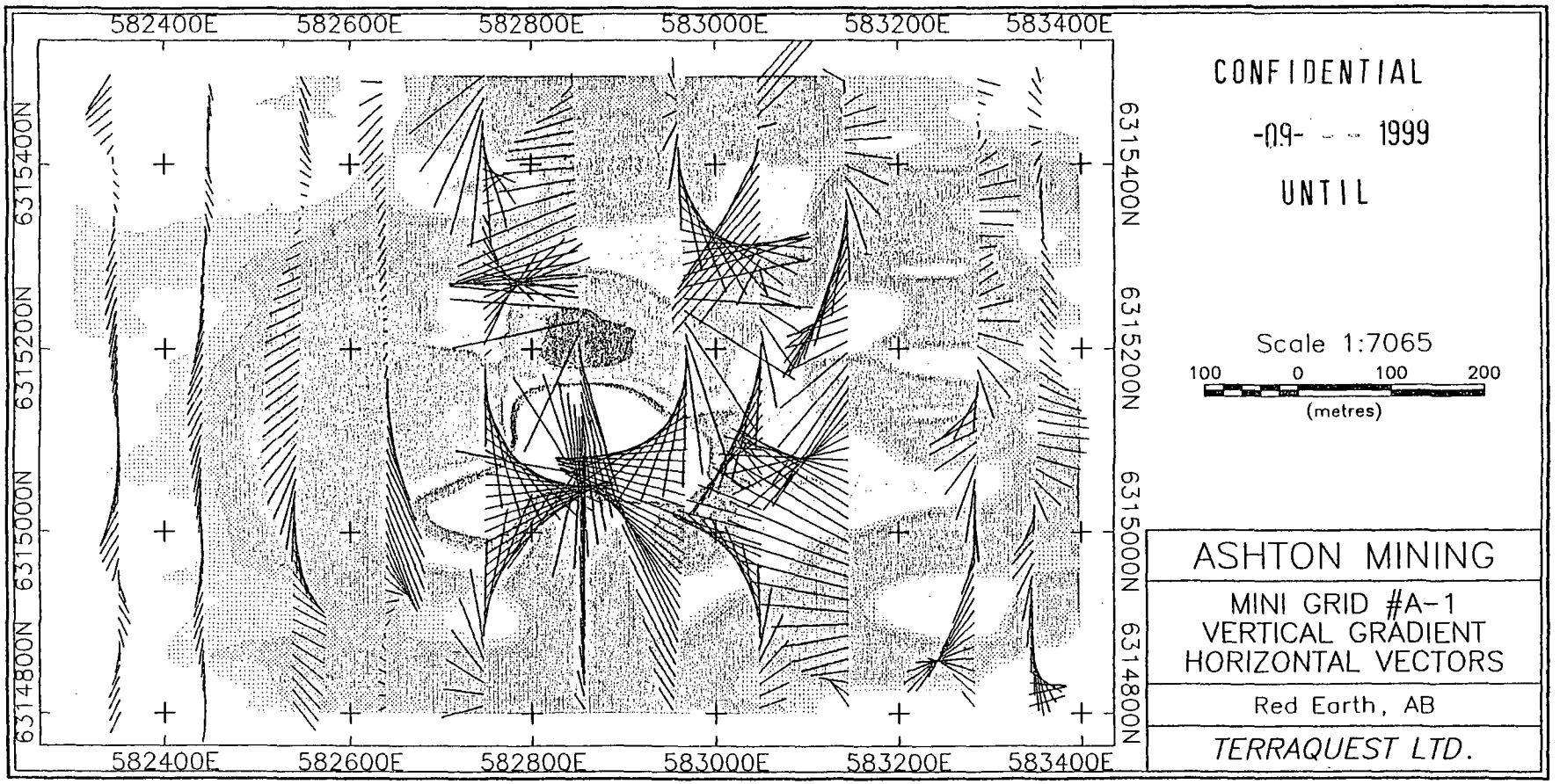
(metres)
ASHTON MINING
MINI GRID #A
TOTAL FIELD
RED EARTH, AB
TERRAQUEST LTD.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6315000N
6314800N
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Scale 1:7065
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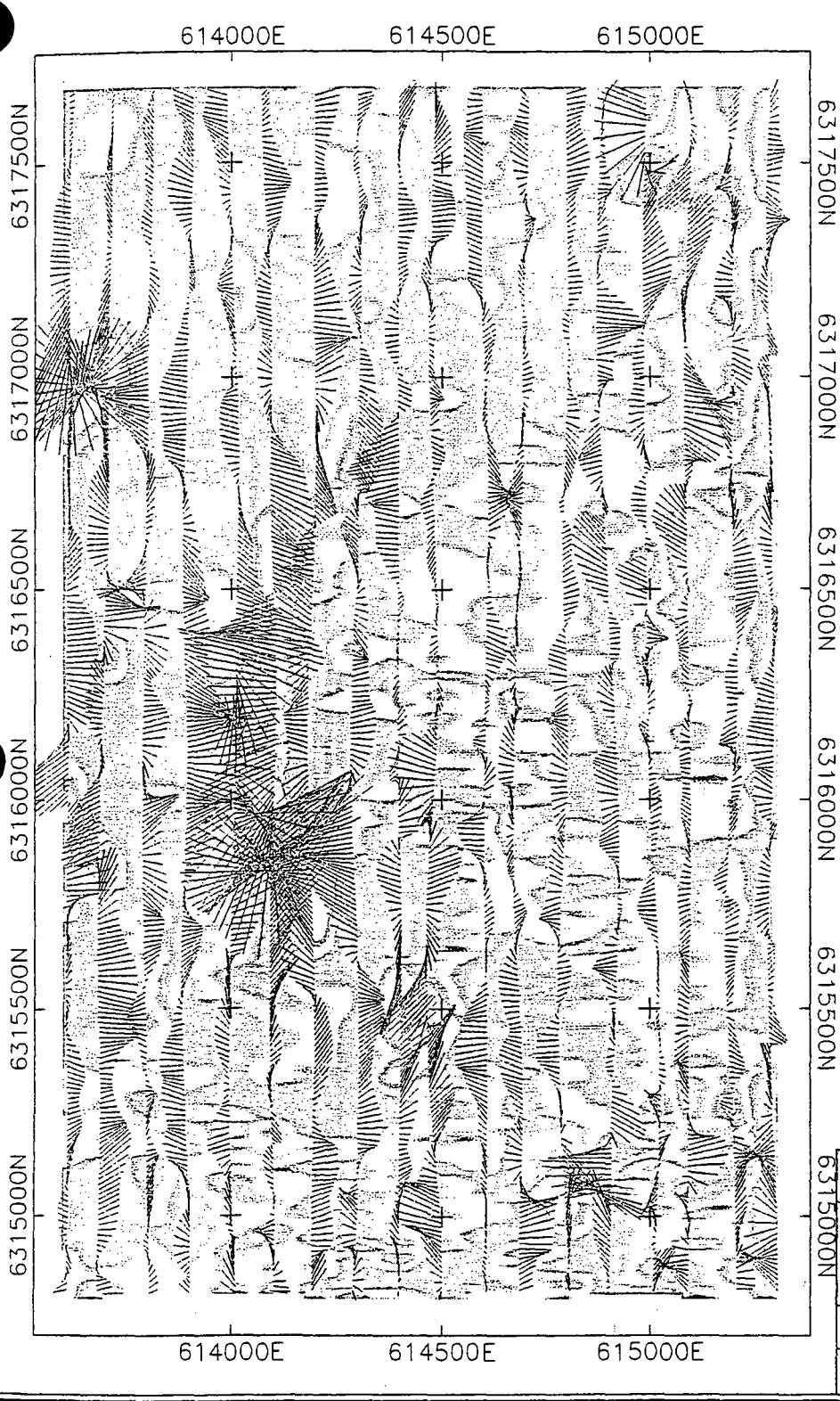
(metres)
ASHTON MINING
MINI GRID #A-1
VERTICAL GRADIENT
HORIZONTAL VECTORS
Red Earth, AB
TERRAQUEST LTD.



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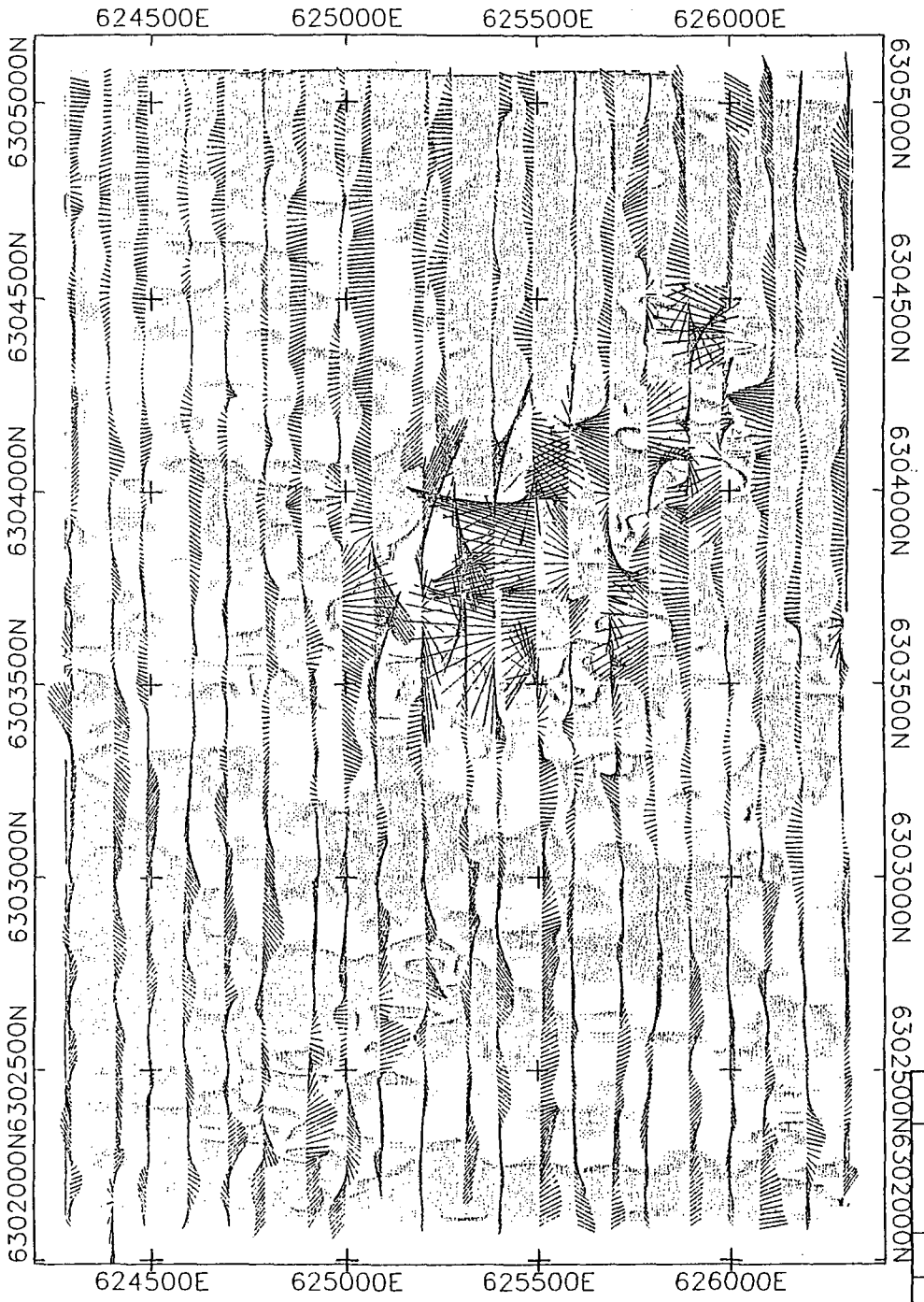
Scale 1:15571.82

250 0 250

(metres)

ASHTON MINING
MINI GRID #B VERTICAL GRADIENT HORIZONTAL VECTORS
Red Earth, AB
TERRAQUEST LTD.



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Scale 1:17783

250 0 250

(metres)

ASHTON MINING

MINI GRID #C
VERTICAL GRADIENT
HORIZONTAL VECTORS

Red Earth, AB

TERRAQUEST ITD.

Further, not being subject to the generalization of the gridding process, the horizontal gradient vectors 1) point precisely to the location of the centre of the anomaly between the flight lines, and 2) identify the strongest responses along the length of the anomalous trend.

Mini Grid C is located just beyond the eastern edge of the main survey. The detail provided by the contours suggests that this body has been cut and displaced en echelon style by several northwest trending structures. Again, the horizontal vectors display a yet a higher degree of detail within the anomaly.

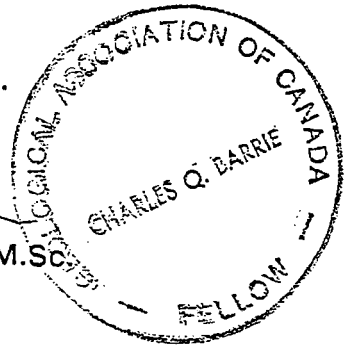
8.0 SUMMARY

An airborne high sensitivity, high resolution magnetic survey has been carried out at 80 metre terrain clearance, 250 metre line intervals and with data sample stations at 6 metres along the lines. Ties lines were spaced at 1.2 kilometres. 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 three fully compensated magnetometer located in a rear stinger and two wing tip pods, radar altimeter, barometric altimeter and all attendant GPS data. Data quality control was carried out independently by Spectra Exploration Geoscience Corp. under the direction of the client. The magnetic data have been processed, gridded (cell size 60 metres), plotted and provided on CD-ROM. Cultural effects have not been filtered or edited out. Micro-levelling (decorrugation) has been performed on the data. Final products at a scale of 1:100,000 include total field reduced to pole, horizontal gradient vectors superimposed over contours of vertical derivative, and flight path with digital images of topography and well locations.

Beyond the request of the contract, Terraquest Ltd. surveyed three mini grids at 100 metre line intervals and at 30 metre terrain clearance. These surveys demonstrate the efficiency and effectiveness of a light, long range fixed-wing aircraft to obtain 1) low-level resolution, single sensor magnetics, and 2) ultra resolution provided by measured horizontal gradiometry over mini grids.

TERRAQUEST LTD.

Charles Q. Barrie, M.Sc.



A976 (Red Earth) - Flight Log

DATE	FLIGHT#	LINE #	Comments
June 16	G914	5650, 5640	5640 GPS-Z wrong
June 21	G915	5600-5640	Video problem, refly
June 21	G915a	10 - 40	Comp flight
June 21	G915b	50 - 80	FOM flight
June 21	G915c	5400	
June 16	G916	5540-5590	
June 23	G917	5500-5530	
June 24	G922	5370-5390 5410-5451	R*.R* wrong, recovered using gap recovery method.
June 27	G923	5260-5290 5310-5360	
June 29	G924	5250	
June 29	G924a	5180-5230	5180 too short, refly
June 29	G925	5150-5180	
June 30	G927	5070-5140	
June 30	G928	5010-5070	
July 01	G929	5300, 5600-5610 5460-5490	5610 aborted
July 01	G929a	5611	reflight of 5610
July 02	G930	5620-5650	refly
July 02	G930a	L10, 60	
July 02	G931	L3210-3260	
July 03	G932	L30-50, 70-80	
July 03	G933	L90-180	base file missing, not processed yet
July 04	G934	L190-220	
July 04	G935	L230-280	
July 05	G936	L290-390	Base files for L290-320 missing, these three lines not included in the shipment
July 05	G937	400-470	
July 06	G938	480-550	raw data missed, refly

July 08	G939	560-630	
July 09	G940	640-730	
July 12	G941	740-790	
July 13	G943	800-850	
July 16	G944a	860-910	
July 16	G944	T5320, 5240, L850	
July 22	G947	990-1080	
July 23	G948		Compensation and FOM flight
July 25	G949	3250-3260	
July 26	G952	3170-3190,3210-3240	
July 27	G953	3090-3160	
July 28	G954	2990-3080	
July 28	G955	2950-2980	
July 29	G956	2850-2920,2940	
July 29	G957	2790-2840	
July 29	G958	2750-2780	
July 30	G959	2690-2740	
July 31	G960	2590-2660	
July 31	G960a	2680	
July 31	G961	2490-2580	
Aug. 01	G964	2410-2480	
Aug. 01	G964a	2370-2380	
Aug. 01	G964b	2390-2400	
Aug. 02	G965	T5321	Refly
Aug. o2	G967	2250-2360	
Aug. 03	G968	2130-2240	
Aug. 03	G969	1170-1260	DGPS problem, refly
Aug. 04	G970	5331, 5341	Refly
Aug. 04	G970a	1560-1630	
Aug. 05	G972	1640-1650	
Aug. 05	G973	1270-1280	Data wrong, not processed
Aug. 07	G975	1660-1670	
Aug. 08	G976	1680-1730	DGPS problem, reflyded
Aug. 11	G980	1480-1550	1480-1520 used GPS

		1740-1770	Used gap recovery method
Aug. 10	G981	1780-1810	Data recovered using Gap
		2100-2120	Recovery Method
Aug. 28	G1000	1090-1100	
Aug. 30	G001	1110-1200	
Aug. 30	G002	1210-1240	
Sep. 01	G003	1250-1360	
Sep. 01	G004	1370-1400	
Sep. 05	G005	1410-1440	
Sep. 05	G006	1450-1470	
		1820-1850	1830 only a part line
Sep. 06	G007	1860-1870	1870 only a part line
Sep. 06	G009a	1880-1920	
Sep. 07	G010	1930-1990	
Sep. 09	G013	2000-2070	
Sep. 10	G014	2090, 2670	
		2930,3200	
Sep. 10	G015	2080	
Sep. 10	G015a	540-550, 2070	
Sep. 17	G017	480-530,1300	
Sep. 17	G017a	1310,1680-1700	
Sep. 26	G026	3141	Refly
Sep. 24	G027	101, 291-321, 691	All refly, 100 flight path wrong before
		920-950	
Sep. 25	G028	1501,1521,1551	all refly
		960-980	
Sep. 26	G029	1700-1730, 1751,1771	all refly
		1831,1871,2421,2551	all refly
		2571, 2661, 2871	all refly
Sep. 26	G030	2981	all refly
Sep. 28	G031	T5591, 5551,5351,5361	all refly
		2881,2941	all refly
Sep. 30	G032	1221,1791-1811	all refly
		2101-2121.2451	all refly

Oct. 24	**G039**	**351,1792,1881,** **2591,2791,2951,3051**	351 not included, flight path same as before, flew over a huge tower
Oct. 25	**G040**	**1671,2611,2801,2811,**	2611,2801 and 2921 were not included
		2831,2841,2921,3091	due to noise / radar problem, will be reflow again
Oct. 26	**G041**	**151-181,1051,1471**	1471 bad radar, not included, was called
		1651,1661	to refly again
Oct. 26	**G042**	**111-141**	
Oct. 28	**G043**	**1472,1552,2612,2802,2922**	
Nov. 04	**G052**	**1052, 111,161,1651,1661**	

APPENDIX II

PERSONNEL

Field:	Pilots	David Breddam
		Mike Forgac
	Operator/Technician	Mike Abbot
	Operator	Mike Forgac
	Geophysicist	Dr. Shuchun Du
Office:	Manager	Charles Q. Barrie
	Geophysicist	Dr. Shuchun Du
	Senior Geophysicist/Processor	Chris Vaughn (Controlled Geophysics Inc.)

APPENDIX III

CERTIFICATE OF QUALIFICATION

I, Charles Q. Barrie, certify that I:

1. am registered as a Fellow with the Geological Association of Canada and work as a Professional Geologist.

2. hold an honours B.Sc. degree in Geology from McMaster University, obtained in 1977.

3. hold an M.Sc. degree in Geology from Dalhousie University, obtained in 1980.

4. am a member of the Prospectors and Developers Association of Canada.

5. am a member of the Canadian Institute of Mining, Metallurgy and Petroleum.

6. have worked seasonally as a geological student in the mining industry for five years, and continuously as a geologist for seventeen years.

7. am employed by and am an owner of Terraquest Ltd., specializing in high sensitivity airborne geophysical surveys.

8. and that the accompanying report has been prepared from airborne data collected by Terraquest Ltd. exclusively for ASHTON MINING OF CANADA INC. I do not have any interest in the property nor have I visited the property.

Mississauga, Ontario
January 20, 1998

Signed,

[redacted]

Charles Q. Barrie, M.Sc.

APPENDIX D

DRILL HOLE LOCATION MAP
SUMMARY OF DIAMOND DRILLING
SUMMARY OF REVERSE CIRCULATION DRILLING
DRILL HOLE LOGS

Appendix D
Summary of Diamond Drilling

Site #	Drill Hole #	Easting	Northing	Legal Location*	Total Depth (m)	Azimuth	Collar
1A	DDH1A-1	569562	6284753	89-12 8-8	160.2	-	-90
1A	DDH1A-2	569562	6284754	89-12 8-8	157.2	360	-58
1A	DDH1A-3	569563	6284751	89-12 8-8	75.1	180	-58
1B	DDH1B-1	568989	6284585	89-12 8-7	155.1	-	-90
1B	DDH1B-2	568989	6284587	89-12 8-7	77.4	360	-58
1B	DDH1B-3	568989	6284583	89-12 8-7	224.2	180	-60
2	DDH2-1	571566	6287827	89-12 22-5	227.8	180	-60
4A	DDH4A-1	578380	6301519	90-11 32-10	128.01	-	-90
4A	DDH4A-2	578380	6301519	90-11 32-10	51.50	180	-60
4A	DDH4A-3	578380	6301519	90-11 32-10	152.4	90	-60
4B	DDH4B-1	578464	6300991	90-11 32-7	200.25	-	-90
4B	DDH4B-2	578461	6300989	90-11 32-7	32.0	270	-60
4C	DDH4C-1	578821	6301274	90-11 32-9	105.67	-	-90
4C	DDH4C-2	578821	6301274	90-11 32-9	121.0	180	59
5A(1)	DDH5A-1	582687	6306035	91-11 14-8	139.30	-	-90
5A(1)	DDH5A-2	582687	6306035	91-11 14-8	139.29	270	-60
5A(1)	DDH5A-3	582687	6306035	91-11 14-8	142.34	90	-60
5A(2)	DDH5A-4	582488	6306214	91-11 14-10	115.2	-	-90
5A(2)	DDH5A-7	582488	6306214	91-11 14-10	127.1	180	-58
5A(2)	DDH5A-8	582489	6306213	91-11 14-10	127.1	180	-80
5A(2)	DDH5A-10	582490	6306217	91-11 14-10	154.5	45	-58
5A(3)	DDH5A-5	582333	6306058	91-11 14-7	90.5	-	-90
5A(3)	DDH5A-6	582334	6306058	91-11 14-7	96.6	90	-58
5A(4)	DDH5A-9	582442	6305767	91-11 14-2	72.3	-	-90
5B	DDH5B-1	582812	6306408	91-11 14-9	148.43	-	-90
5B	DDH5B-2	582812	6306408	91-11 14-9	142.34	270	-60
6(1)	DDH6-1	585262	6308732	91-10 30-3	200.25	-	-90
6(2)	DDH6-2	585550	6308382	91-10 19-15	138.70	-	-90
6(1)	DDH6-3	585263	6308731	91-10 30-3	182.9	180	-58
6(1)	DDH6-4	585264	6308733	91-10 30-3	111.9	360	-58
6(1)	DDH6-5	585263	6308732	91-10 30-3	217.3	90	-58
6(1)	DDH6-6	585262	6308732	91-10 30-3	133.2	270	-70
6(2)	DDH6-7	585550	6308383	91-10 19-15	160.6	360	-60
6(2)	DDH6-8	585550	6308382	91-10 19-15	150.9	180	-60
6(2)	DDH6-9	585550	6308383	91-10 19-15	30.5	270	-60
6(2)	DDH6-10	585550	6308383	91-10 19-15	197.2	270	-75
6(2)	DDH6-11	585550	6308383	91-10 19-15	45.7	90	-80
7A	DDH7A-1	583261	6311235	91-11 36-11	200.25	-	-90
7B	DDH7B-1	583131	6312089	92-11 1-4	154.53	-	-90
7C	DDH7C-1	583052	6312455	92-11 1-5	92.05	-	-90
14(1)	DDH14-1	582882	6315049	92-11 12-13	200.0	-	-90
14(1)	DDH14-2	582883	6315054	92-11 12-13	230.7	360	-57
14(1)	DDH14-3	582883	6315050	92-11 12-13	198.8	180	-75

Site #	Drill Hole #	Easting	Northing	Legal Location*	Total Depth (m)	Azimuth	Collar
14(1)	DDH14-4	582883	6315050	92-11 12-13	197.2	270	-58
14(1)	DDH14-5	582883	6315050	92-11 12-13	255.1	90	-59
19	DDH19-1	575033	6289103	89-12 25-3	133.19	-	-90
19	DDH19-2	575034	6289102	89-12 25-3	90.5	180	-58
19	DDH19-3	575034	6289104	89-12 25-3	204.5	360	-58

*All sites are west of the 5th meridian

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Appendix D
Summary of Reverse Circulation Drilling

Site #	Drill Hole #	Easting	Northing	Legal Location*	Total Depth (m)
6-1	RC6-1	585202	6308728	91-10 30-3	27.4
6-1	RC6-2	585227	6308731	91-10 30-3	9.1
6-1	RC6-2A	585228	6308731	91-10 30-3	35.1
6-1	RC6-3	585302	6308733	91-10 30-3	77.5
6-1	RC6-4	585350	6308731	91-10 30-2	89.9
6-1	RC6-5	585368	6308736	91-10 30-3	95.8
14-1	RC14-1	582868	6315054	92-11 12-13	13.4
14-1	RC14-2	582848	6315059	92-11 12-13	86.8
Access	RC14-3	582816	6315054	92-11 12-13	88.4
Access	RC14-4	582896	6315075	92-11 12-13	99.1
Access	RC14-5	582918	6315084	92-11 13-4	86.8
Access	RC14-6	582956	6315090	92-11 13-4	89.9
Access	RC14-7	582933	6315088	92-11 13-4	94.5
14C	RC14-8	583063	6315570	92-11 13-4	30.5
Access	RC14-9	583063	6315570	92-11 13-5	70.1

*All sites are west of the 5th meridian
Note: All holes were drilled at -90°.

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Diamond Drill Hole Summary Log

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DDH # : 1A-1

Property: BUFFALO HILLS
Claim name: 89-12-8-8-5
Claim number: 9396060035
Map NTS: 84B/12

Start date: July 5, 1997
End date: July 7, 1997
Contractor: CONNORS
Geologist: DERRICK STRICKLAND

Elevation: 732.50
Anomaly # : 1A
UTM zone: 11
Northing: 6,284,752.82
Easting: 569,562.34
Permit # : MME-970336

Hole Length: 160.20
Azimuth at Collar:
Incline at Collar: -90.00
Core size: HQ
Measure. units: m

Purpose of Hole: To test anomaly 1A.

FROM	TO	Description
0.00	20.42	OVERURDEN
20.42	99.00	KIMBERLITE - Crystal (olivine) lapilli tuff. - Grey green, fine grained, composed of rounded and angular olivine (25%-35%) that has altered to serpentine and carbonate, up to 0.75 x 0.75cm. Some olivine alters to a brown colour: there may be two populations of olivine: one <3.0mm and the other >0.3mm. - Matrix (30%-40%) is granular in appearance and fine grained. - Xenoliths: Angular serpentinized fragments <0.5cm (20%), angular shale fragments with embayed olivine and well rounded limestone up to 2.5 x 3.0cm. - Lapilli range in size from 0.2 x 3.5mm with the kernels being olivine, other lapilli, and/or shale; several of them are concentric in nature.
99.00	103.20	MUDSTONE & KIMBERLITE - Grey black in colour. - Soft unconsolidated material with kimberlite clasts intermittent throughout.
103.20	160.20	MUDSTONE - With minor sand blebs and interlayered sandstone units. - Mudstone is grey in colour and unconsolidated. - Bedding is 60° to core axis. - 103.20-103.50m is a limestone occurrence, locally vuggy, grey, massive, coral? EOH @ 160.20m.

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Diamond Drill Hole Summary Log

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DDH # : 1A-2

Property:	BUFFALO HILLS	Start date:	July 7, 1997
Claim name:	89-12-8-8-5	End date:	July 11, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/12	Geologist:	DERRICK STRICKLAND
Elevation:	732.45	Hole Length:	157.20
Anomaly # :	1A	Azimuth at Collar:	360.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,284,754.41	Core size:	HQ
Easting:	569,562.23	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 1A.

FROM	TO	Description
0.00	33.53	OVERBURDEN
33.53	154.70	KIMBERLITE - Olivine lapilli tuff, greenish-grey in colour, fine grained. - Olivine macrocrysts and groundmass olivine comprise 30-35%, with serpentine alteration. - Lapilli up to 0.7x0.7cm, light grey-yellow in colour, <1%. - Xenoliths of black and green shale. - Competence increases downhole. - Contains sections of kimberlitic mud? - At 116.20m a distinct bed (3cm thick) of light green tuff occurs overlying a granular, light brown tuff. Flame structures intrude from this unit into the overlying green bed. - Beneath this bed the xenolithic content increases somewhat, and packing of grains and clasts is looser, with the matrix comprising 60-70% of the rock. Olivine macrocrysts now account for 10-15%.
145.70	157.20	MUDSTONE -Grey-brown, bedding at 85° TCA. EOH @ 157.20m. Roto dip test at EOH is -58°.

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DDH # : IA-3

Property:	BUFFALO HILLS	Start date:	July 12, 1997
Claim name:	89-12-8-8-5	End date:	July 14, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/12	Geologist:	DERRICK STRICKLAND
Elevation:	732.53	Hole Length:	75.09
Anomaly # :	IA	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,284,751.15	Core size:	HQ
Easting:	569,562.73	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly IA.

FROM	TO	Description
0.00	35.05	OVERBURDEN
35.05	41.76	KIMBERLITE - Crystal (olivine) tuff, medium grey in colour, fine grained granular in appearance. Matrix makes up 50%-60%, and with minor amounts of carbonate. - Lapilli <1% are light brown with irregular boundaries, and measure up to 0.5 x 0.5cm. - Olivine: both macrocryst and groundmass olv are present, 10%-20%, alternates to brown with <1% pyrite internally. - Carbonate crystal <1%, 0.2 x 0.2cm, white, <2% green shale clasts 1 x 1cm, <3% black shale. - Mica, white and brown <1%, rounded 0.3 x 0.3cm. - Carbonate veinlets throughout <3%, range in size from 0.2 to 3cm. From 40.40-41.76m, masses of carbonate veinlets and carbonate alteration has turned the rock a light grey colour. - At 41.76m, the contact between kimberlite and mudstone is poorly defined and an intermix of the two occurs.
41.76	53.14	MUDSTONE - Light grey in colour. - Bedding @ 67° to core axis. - Rock has a slimy feel when wet, may not be fully lithified, has an earthy smell. - 44.8m, pyrite seam.
53.14	63.50	LIMEY MUDSTONE - Black, carbonate-rich mudstone with layers of invertebrate fossil shells throughout the section. Bedding @ 68° TCA. - Possible thin (5-20cm) volcanic ash layers throughout.
63.50	78.33	MUDSTONE - Light grey in colour with bedding at 68° TCA. - Contact not seen between upper and lower unit. EOH @ 78.33m.

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DDH # : 1B-1

Property: BUFFALO HILLS
Claim name: 89-12-8-7-5
Claim number: 9396060035
Map NTS: 84B/12

Start date: July 7, 1997
End date: July 11, 1997
Contractor: CONNORS
Geologist: DERRICK STRICKLAND

Elevation: 740.21
Anomaly # : 1B
UTM zone: 11
Northing: 6,284,585.07
Easting: 568,989.23
Permit # : MME-970336

Hole Length: 155.14
Azimuth at Collar:
Incline at Collar: -90.00
Core size: HQ
Measure. units: m

Purpose of Hole: To test anomaly 1B.

FROM	TO	Description
0.00	18.29	OVERBURDEN
18.29	20.30	BROKEN CORE BOULDERS - Kimberlite and sandstone boulders.
20.30	138.50	KIMBERLITE - Olivine tuff. Grey green in colour, fine grained, granular in appearence. - Composed of angular, light green fragments of serpentine, 30-40%, up to 0.8 x 0.6cm, round to angular: brown altered olivine 20-30%. - The matrix is fine grained and comprises 40-50% of the rock. - Lapilli of a light grey material composed of fragmental, altered brown olivine and serpentine fragements, lapilli measured up to 1.5 x 1.8cm with irregular boundaries. - Trace white mica? muscovite? - Carbonate present in the matrix, replacement? primary? - Core has a distinct oil smell. - Black shale fragments up to 1.3 x 0.6cm, some are pyrite rich. -Core is broken and crumbly, weathered.
138.50	155.14	MUDSTONE & SANDSTONE - Mudstone, consolidated. - Bedding ~45° to core axis, grey in colour. 141.20-141.50m Sandstone/mudstone breccia. 141.72-142.29m Sandstone/mudstone breccia. 142.29-143.94m Sandstone, brown grey. 143.94-150.37m Mudstone, light grey, unconsolidated, minor amounts of limestone xenoliths. 150.37-151.49m Sandstone, light grey. 151.49-155.14m Mudstone and sandstone intermixed with bedding at 40° TCA, light grey. EOH @ 155.14m.

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DDH # : 1B-2

Property:	BUFFALO HILLS	Start date:	July 9, 1997
Claim name:	89-12-8-7-5	End date:	July 14, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/12	Geologist:	DAVE SKELTON
Elevation:	740.20	Hole Length:	77.42
Anomaly # :	14	Azimuth at Collar:	360.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,284,586.71	Core size:	HQ
Easting:	568,989.07	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 1B.

FROM	TO	Description
0.00	18.89	OVERBURDEN
18.89	66.26	KIMBERLITE - Olivine lapilli tuff, grey-green, fine grained, granular in appearance. Matrix comprises 50-60% of the rock. Light grey-yellow lapilli comprise <2%, to 3cm, with irregular and rounded margins. Peridotite nodules present, <1%. Olivine macrocrysts are altered to serpentine with a trace of pyrite. Also present in trace amounts are chrome diopside, pyrope, orange garnet, white mica and wood fragments. Black and green shale xenoliths comprise ~3%. Bedding may be present at 62.00m where a 2cm wide zone shows a change in grain size. The kimberlite-mudstone contact is not well-defined and consists of a zone 30cm wide with intermixed kimberlite and mudstone.
66.26	77.42	MUDSTONE - Grey-brown grading to black-brown downhole, bedding at 68° TCA, with soft sediment deformation features. EOH @ 77.42m.

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DDH # : 1B-3

Property:	BUFFALO HILLS	Start date:	July 16, 1997
Claim name:	89-12-8-7-5	End date:	July 23, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/12	Geologist:	D. STRICKLAND
Elevation:	740.11	Hole Length:	224.22
Anomaly # :	1B	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,284,583.29	Core size:	H-N
Easting:	568,989.25	Measure. units:	m
Permit # :	MME97-0336		

Purpose of Hole: To test anomaly 1B.

FROM	TO	Description
0.00	15.24	OVERBURDEN
15.24	224.22	KIMBERLITE - Olivine lapilli tuff. Light brown-green, matrix comprises an average of 40-50% and is fine-grained and granular. Macrocrysts and groundmass olivine (avg 30-40%) are serpentinized at the top of the hole. Localized areas where olivine comprises 60-70% of the rock occur. Other constituents include lapilli (<3%, to 5cm), white mica (<1%), carbonate (5-10%), black shale xenoliths (<1%, to 11cm), grey shale xenoliths (<1%, to 6cm), and black wood fragments (<1%, to 9cm). - From 15.24-159.91m, the kimberlite is generally matrix-rich and may be composed of kimberlite mud. Between 159.91m and 164.26m, the kimberlite becomes coarser grained, better sorted, and closely packed. Macrocrysts comprise 40% of the rock volume and lapilli increase to 20%. From 164.26-176.70, the kimberlite is again finer grained and here calcite veins are common. This core is friable and not well-preserved, with sometimes only 60% recovery. From 176.70-224.22m the kimberlite is generally coarse grained with abundant macrocrysts and lapilli. Minor kimberlite mud intervals also occur. EOH @ 224.22m.

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DDH # : 2-1

Property:	BUFFALO HILLS	Start date:	July 24, 1997
Claim name:	89-12-22-5-5	End date:	July 27, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/12	Geologist:	R. JOHNSON
Elevation:	757.45	Hole Length:	227.77
Anomaly # :	2	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,287,827.42	Core size:	HQ
Easting:	571,565.78	Measure. units:	M
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 2.

FROM	TO	Description
0.00	2.72	OVERBURDEN
2.72	225.77	KIMBERLITE - Very weathered and/or altered volcaniclastic kimberlite, greyish-brown to pale grey in colour, comprised macroscopically of olivine macrocrysts, basement xenoliths, cored lapilli, autoliths, wood fragments, crustal xenoliths, and sand set in a crumbly black matrix which resembles (ordinary) mud. Textures are matrix supported and the rock is generally medium grained. The matrix is moderately carbonate-rich and potentially granular. Definitive sedimentary structures and textures such as bedding planes with deformed surfaces are present. Except in the case of distinctive bedding planes, this kimberlite is poorly to moderately sorted and (within beds) interally structureless. Locally, it is possible to observe individual beds which remain traceable, but which have been disrupted. From the start of the hole to approximately 81m, macrocrysts show some breakage. Below 81m, abundant broken and shard-like olivine indicate common breakage and may suggest rapid and/or turbulent transport of this material. - Intervals of sand and mixed sand-kimberlite occur throughout this hole. From 28.65-43.89m, the kimberlite contains intervals where sand comprises up to 60% of the groundmass. From 43.89-53.13m, only sand, sandstone, shale and mudstone are present. From 55.70-75.32m, sand and sand veins are present within the kimberlite and from 80.57-88.90m a large intersection of shale and sandstone occur.
225.77	227.77	SANDSTONE - Some deformation is present. EOH @ 227.77m.

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Diamond Drill Hole Summary Log

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DDH # : 4A-1

Property:	BUFFALO HILLS	Start date:	February 14, 1997
Claim name:	90-11-32-10-5	End date:	February 16, 1997
Claim number:	9396060042	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	767.02	Hole Length:	128.01
Anomaly # :	4A	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,301,519.04	Core size:	NQ
Easting:	578,380.01	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 4A.

FROM	TO	Description
0.00	24.70	OVERBURDEN
24.70	128.01	ALTERED KIMBERLITE - The rock has a variable character. - The top section of the hole is medium rusty brown with grey. Locally silica replacement (?) is evident. - Several granular masses of purple - red gamet are observed as well as small (~1mm) granular masses of chromite. - At the 38m mark the rock becomes light buff to light green w/ a granular groundmass and dark green altered olivines. - In this section the olivine crystals make up 20-25% of the rock, the light colored matrix makes up the other 75-80%. - At the 51.5m mark olivine crystals make up ~45% of the rock, the groundmass decreases to ~55%. - At the 68m mark the rock becomes a fine grained mass of rounded mica. - Between 113m to 128m the rock is composed of 60-70% altered olivine crystals. The remaining 30-40% of the rock consists of a fine grained vitreous green serpentine. - Granitic, sandstone, shale & carbonate xenoliths ranging in size from 1mm to 70mm are angular and visible throughout the core. - Rock is competent and recovery is ~90%. - The hole was lost and casing remains in the ground between 10 and 25m. EOH @ 128.01m.

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Diamond Drill Hole Summary Log

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DDH # : 4A-2

Property:	BUFFALO HILLS	Start date:	February 16, 1997
Claim name:	90-11-32-10-5	End date:	February 18, 1997
Claim number:	9396060042	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	767.02	Hole Length:	51.50
Anomaly # :	4A	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,301,519.04	Core size:	NQ
Easting:	578,380.01	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 4A.

FROM	TO	Description
0.00	25.75	OVERBURDEN
25.75	51.50	ALTERED KIMBERLITE - Rock is medium rusty brown to light grey green. Rock is badly weathered - competent in spots. Rock is composed of 80%-90% granular fine grained matrix (carbonate?). Constituents are too small to see with binocular microscope. - Remaining ~20% is made up of what remains of badly weathered olivine grains. Chromite is evident as small granular masses with pitchy luster and brown streak. Last 20cm of core exhibit 75-80% altered olivine crystals, light to medium green. Olivine crystals make up a continuous mass, in the spaces between this mass is a fine grained matrix which alternates between calcite and fine grained medium green serpentine. - Xenoliths consisting of shale, carbonate and sandstone (?) are subround to angular and range in size from 2mm to 17mm. Rock ranges from competent to quite broken up. EOH @ 51.50m.

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Diamond Drill Hole Summary Log

DDH # : 4A-3

Property:	BUFFALO HILLS	Start date:	August 17, 1997
Claim name:	90-11-32-10-5	End date:	August 19, 1997
Claim number:	9396060042	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	767.02	Hole Length:	152.40
Anomaly # :	4A	Azimuth at Collar:	90.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,301,519.04	Core size:	H-N
Easting:	578,380.01	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 4A.

FROM	TO	Description
0.00	26.36	OVERBURDEN - Silt to cobbles on top and black mud to bottom. Yellow staining within black mud is present where small, rusty pods are present.
26.36	29.57	MUDSTONE -Medium-grey mudstone, alternating layers of mud and white-coloured non-carbonate, fine grained material which cuts core axis @ 65-70° TCA. Soft sedimentary deformation features may be present.
29.57	39.68	MEDIUM BROWN GRANULAR CARBONATE RICH ROCK -Contains a few purple garnets(?). From 34.14-39.68 is very friable and crumbled.
39.68	47.40	EXTREMELY ALTERED KIMBERLITE - Buff to medium grey rock, extremely weathered, locally with surficial pitting. There are 2 main components to this rock. 1) a cryptocrystalline to opaque component with a small portion of this being quartz and calcite, but for the most part is non-reactive with HCl and is harder than quartz. Radiating fractures are sometimes present. 2) very fine to fine grained granular, light coloured minerals with a small amount of calcite only. Very difficult to identify. This component hosts small amount of light brown mica (phlogopite?). Euhedral quartz growth may be present locally. Distinctively, this component hosts the unusual (clinochrysotile) or antigorite/chorite mineral commonly observed.
47.40	101.13	EXTREMELY ALTERED KIMBERLITE BRECCIA - Light greenish-grey kimberlite with a very fine to fine grained, carbonate-rich, granular matrix with coarse grained remnants of weathered xenoliths, clinochrysotile (antigorite-chlorite) and occasional purple garnets with kelyphitic rims. The rock is a packstone. Carbonate, shale and limestone xenoliths are angular to round and range in size from 5-35mm, with chlorite-antigorite crystals ranging up to 10mm, sometimes curvilinear. Groundmass comprises 50-55% of the rock with the coarser components comprising the rest. This rock is friable and very badly weathered/altered. Locally layering at 60° TCA can be

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DDH # : 4A-3

FROM	TO	Description
		observed, and in such areas the coarse fraction consists nearly entirely of disaggregated antigorite-chlorite crystals as individual mica flakes (to 8mm). - From 73.14-74.37m, an intersection of dark grey mudstone occurs. The top contact is sharp and cuts core axis at ~85°. The lower contact is obscured.
101.13	152.40	KIMBERLITE - Dark green-grey, fine to medium grained rock. Clear to light green, angular to subround olivine of 0.5-5mm comprise 50% of the rock. Mica (phlogopite) phenocrysts are round to subangular and range in size from 0.5-5mm and in places comprise ~3% of the rock: "mica-rich". Subangular carbonate and shale xenoliths range in size from 5-20mm but are in very low abundance of <<1%. Occasional lapilli can also be observed. The matrix is composed of serpentine. Bedding is defined by elongate clasts with a preferred orientation of 47° TCA. Graded bedding is also observed. A large mica-rich siltstone occurrence at 104.24m measures 0.92m. At ~148m, mm-scale carbonate veins cut core axis at 70°. Mica content decreases with depth. The last ~2m are weathered medium-grey in colour. EOH @ 152.4m due to occurrence of natural gas.

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DDH # : 4B-1

Property:	BUFFALO HILLS	Start date:	February 19, 1997
Claim name:	90-11-32-7-5	End date:	February 21, 1997
Claim number:	9396060042	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	785.96	Hole Length:	200.25
Anomaly # :	4B	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,300,991.37	Core size:	NQ
Easting:	578,464.10	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 4B.

FROM	TO	Description
0.00	8.50	OVERBURDEN
8.50	200.25	KIMBERLITE - Kimberlite ranges in colour from medium rusty brown through light grey-green to black. Weathered rust brown section extends down to 19.5m. - Rock is composed of 60-70% fragmented, subangular to subrounded olivine crystals that range from 1mm to ~12mm in size and are bright olive green in color. - At approximately the 83m mark the core begins to exhibit rounded equigranular olivine crystals many of which contain carbonate (calcite?) in their cores. - The remaining 30-40% of the rock consists of a fine grained matrix. This matrix is made up mostly of carbonate (25%-30% of whole rock) and approximately 10% of serpentine. The matrix is light grey brown to white to light pale green in color & vitreous. - Phlogopite is observed to ~1%, crystals range from 1-5mm, are green to copper colour and are subrounded to angular. - Xenoliths consist of sandstone, shale, granitic and carbonate clasts which range in size from 0.5 to 5cm, none of which were observed with reaction rims. - The core is predominately competent. EOH @ 200.25m.

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DDH # : 4B-2

Property:	BUFFALO HILLS	Start date:	February 21, 1997
Claim name:	90-11-32-7-5	End date:	February 22, 1997
Claim number:	9396060042	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	DERRICK STRICKLAND
Elevation:	785.83	Hole Length:	32.00
Anomaly # :	4B	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,300,989.95	Core size:	NQ
Easting:	578,461.31	Measure. units:	m
Permit # :	MME-961352		

Purpose of Hole: To test anomaly 4B.

FROM	TO	Description
0.00	8.20	OVERBURDEN
8.20	32.00	ALTERED KIMBERLITE - Light brown to yellow, fine to medium grained, rounded (olivine) grains, highly altered with variable (blebby) silicification and carbonatization, locally vuggy, incompetent and crumbly within volcaniclastic kimberlite. - Distinct bedding at 35°-45 ° TCA - interbedded coarse and fine grained sequences - crater facies textures. EOH @ 32.00m.

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DDH # : 4C-1

Property: BUFFALO HILLS
Claim name: 90-11-32-9-5
Claim number: 9396060042
Map NTS: 84B/13

Start date: February 22, 1997
End date: February 24, 1997
Contractor: CONNORS
Geologist: DERRICK STRICKLAND

Elevation: 753.12
Anomaly # : 4C
UTM zone: 11
Northing: 6,301,274.06
Easting: 578,821.46
Permit # : MME-961552

Hole Length: 105.67
Azimuth at Collar:
Incline at Collar: -90.00
Core size: NQ
Measure. units: m

Purpose of Hole: To test anomaly 4C.

FROM	TO	Description
0.00	44.00	OVERBURDEN
44.00	77.70	ALTERED KIMBERLITE - Light brown to greyish yellow, medium grained, highly altered matrix with variable silicification and carbonitization, locally vuggy, incompetent and crumbly. - Variable bedding at 15-70° TCA - interbedded silica and carb alt., trace pyrite with silicification. Interbedded coarse and fine grained crater facies sequences. 5-10% shale clasts, serpentinized fragments and small lapilli. Shale clasts can reach >10cm and occasionally display embayment features where olivines have been pressed into the shale clast. - Common green mineral - chlorite-antigorite - to 35%, and up to 15 % unaltered olivine towards gradational lower contact.
77.70	105.67	KIMBERLITE - Light green to greyish green, fine to coarse grained, carbonate/serpentine matrix. Generally weakly magnetic. - 35-70% olivine in duel population of phenocrysts and macrocrysts, 10-35% blue green chlorite-antigorite to >1cm, Variable crater facies textures, graded bedding at 70°-90° TCA, beds grade upwards from coarse (olivine packstone) to fine, with localized soft sediment deformation features. - 5-10% shale clasts, serpentinized fragments and lapilli. Lapilli contain trace spinel, Shale clasts to >10cm, some with sulfides, can contain embayed olivine grains. - Some Fe staining, occasional tar on fractured surfaces. EOH @ 105.67m.

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DDH # : 4C-2

Property:	BUFFALO HILLS	Start date:	February 24, 1997
Claim name:	90-11-32-9-5	End date:	February 25, 1997
Claim number:	9396060042	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	A. BERRY
Elevation:	753.12	Hole Length:	121.00
Anomaly # :	4C	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-59.00
Northing:	6,301,274.06	Core size:	NQ
Easting:	578,821.46	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 4C.

FROM	TO	Description
0.00	50.90	OVERBURDEN
50.90	68.86	ALTERED KIMBERLITE - Orange brown to red brown limonitic +- hematitic alteration. - Generally incompetent, vuggy. Original textures completely altered, olivine crystals altered to white clays in a limonitic matrix. - Variable silicification to localized flooding (>80% silica) occurs: silicification is dominant towards lower contact. Moderate to strong network of carbonate stringers with preferred orientation at 60°-90° TCA, uncommon localized quartz + chlorite stringers to 5mm wide. - <10% xenolithic component, fine grained light coloured rounded to subangular xenoliths to >4cm entirely of sedimentary origin.
68.86	108.48	KIMBERLITE - Light green, variable textures from fine to coarse grained + distinct bedding sequences. - Up to 20% coarse dark green veriform, laminar, chlorite-antigorite crystals in a light green clay-altered serpentine matrix. - Up to 20% dark green to black shale xenoliths with occasional embayment features - embayed olivine on margins and rarely within the xenolith itself. Nice contacts between sequential bedding events, coarse to fine generally at 60° TCA, sequences are from 1-2 cm to several meters in extent. - Noticeable change in olivine alteration levels towards lower contact, grains grade from white clays to clear glassy, slightly yellow. Gradational lower contact.

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FROM	TO	Description
108.48	121.00	KIMBERLITE ASH - Light green equigranular (1-4mm) homogeneous olivine + chlorite-antigorite grains in a light gray clay matrix. - Occasional small (4-5mm) altered non-cored rounded lapilli, common dark green subangular shale xenoliths, occasionally with excellent embayment features. - Very weak carbonate fracture network. EOH @ 121.00m.

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DDH # : 5A-1

Property:	BUFFALO HILLS	Start date:	February 4, 1997
Claim name:	91-11-14-8-5	End date:	February 6, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	A. BERRY, BSS, MM
Elevation:	634.11	Hole Length:	139.30
Anomaly # :	5A(1)	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,306,035.83	Core size:	NQ
Easting:	582,687.67	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: FIRST HOLE IN MAG ANOMALY 5

FROM	TO	Description
0.00	14.30	OVERBURDEN
14.30	27.40	KIMBERLITE - Greenish-brown, poorly sorted, medium-grained volcaniclastic kimberlite with 5-10% xenoliths, locally to 20%, and with abundant olivine macrocrysts and microcrysts (olivine, 1-4mm = 30%). Ameboidal lapilli are also present. Textures are matrix-supported and a weak clast orientation at 40° TCA may be present. Olivines are oxidized and replaced by a combination of serpentine, carbonate and magnetite.
27.40	115.80	BEDDED KIMBERLITE - Greyish green to orangish volcaniclastic kimberlite, generally finer grained than previous unit. Here kimberlite is well-bedded to laminated at sub-horizontal angles of ~70° TCA. Coarser individual beds may contain >15% xenoliths and could be termed breccia beds. Bedding contacts between adjacent beds are distinct but not sharp. Beds are defined by changes in grain size Grain-supported textures dominate and rock is composed of 50-60% olivine grains (generally <2mm) with rare lapilli (increased to <5% in coarser beds). Macrocrysts are generally not common except in coarser beds. The matrix is serpentine-dominated. Oxidation is generally pervasive but becomes weaker with depth. Below 54m, bedding is still present, but is less well defined and beds are less well sorted internally. Carbonate content is low. Unit can be moderately magnetic.
115.80	139.30	MUDSTONE - Very fine-grained, brown, unconsolidated bedded silts and clays. Bedding at 45-50° TCA at kimberlite contact to 80° TCA at EOH. EOH @139.30m.

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DDH # : 5A-2

Property:	BUFFALO HILLS	Start date:	February 6, 1997
Claim name:	91-11-14-8-5	End date:	February 7, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	634.11	Hole Length:	139.29
Anomaly # :	5A(1)	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,306,035.83	Core size:	NQ
Easting:	582,687.67	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 5A(1).

FROM	TO	Description
0.00	16.00	OVERBURDEN
16.00	23.00	KIMBERLITE - Greenish-brown, poorly sorted, macrocrystic and lapilli-bearing volcaniclastic kimberlite which has ~10% xenoliths but >15% locally. Displays weak grain orientation @ 45° TCA but is not well-bedded. May show a general coarsening with depth. Macrocrysts comprise 30% and lapilli 10%. Microcrysts are common in the groundmass.
23.00	119.31	BEDDED KIMBERLITE - Greyish-green to orangish volcaniclastic kimberlite with occasional coarse breccia intervals. 23-40m: Kimberlite is fine and medium-grained and bedding is not well developed. The rock is composed of 50% olivine microcrysts (generally <2mm), and ~3% small (avg 5mm) black shale xenoliths in a carbonate and serpentine matrix. 40-49m: A very coarse breccia zone, rich in cb, where clasts of carbonate, siltstone and shale reach 40% of the rock volume and 50mm, averaging 20mm. Massive (clasts?) of magnetite are also present. Olivine macrocrysts (to 5mm) and lapilli (to 25mm) are abundant. All olivine is either oxidized or black and altered (to serpentine?). Sorting is very poor in this interval. 49-119.31m: The kimberlite is moderately sorted with much distinctive bedding, generally defined by changes in grain size. In fine-grained beds, olivines measure 2mm or less and these areas contain very little country rock xenoliths or macrocrysts. In coarser beds, (1 to 50mm thickness), country rock xenoliths comprise 40% of the bed, along with 20% olivine macrocrysts and microcrysts, and small lapilli (2%). Bedding is at ~50° TCA.

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DDH # : 5A-2

FROM	TO	Description
119.31	139.29	MUDSTONE - Unlithified sediment. Rock is moderately competent but crumbled, recovery is ~55%. EOH @ 139.29m.

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DDH # : 5A-3

Property:	BUFFALO HILLS	Start date:	February 7, 1997
Claim name:	91-11-14-8-5	End date:	February 9, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	634.11	Hole Length:	142.34
Anomaly # :	5A(1)	Azimuth at Collar:	90.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,306,035.83	Core size:	NQ
Easting:	582,687.67	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 5A(1).

FROM	TO	Description
0.00	23.00	OVERBURDEN
23.00	26.00	KIMBERLITE BRECCIA - Greyish-green, poorly sorted volcaniclastic kimberlite breccia with ~25% country rock xenoliths. Macrocrysts comprise ~30% and lapilli ~10%. Microcrysts are common in the groundmass. Olivine xls are serpentinized and often have magnetite cores. Xenolithic fragments are composed of shale and carbonate, and are angular to subrounded. The matrix is composed of serpentine and carbonate.
26.00	131.00	BEDDED KIMBERLITE - Dominantly fine grained kimberlite with lesser medium grained intervals, both showing distinctive though poorly defined bedding throughout the interval. Definition is helped by the occurrence of elongate country rock xenoliths showing orientation at 70 to 75° TCA. Olivines are generally < 2mm and often < 1mm. Olivine overall comprises up to 65% of the rock. Intermittent coarser beds and breccia beds occur but are not frequent. In one such bed macrocrysts measured up to 8mm and country rock xenoliths averaged 25mm. Such beds many be of an irregular thickness. Carbonate content is low and the matrix is composed of serpentine. Lapilli and macrocrysts are present in coarse beds. Sorting is only moderate, even in fine grained beds, and grain supported textures dominate.
131.00	142.34	MUDSTONE - Fine grained mudstone. EOH @ 142.34m.

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DDH # : 5A-4

Property:	BUFFALO HILLS	Start date:	July 28, 1997
Claim name:	91-11-14-10-5	End date:	August 3, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	688.54	Hole Length:	115.20
Anomaly # :	5A(2)	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,306,213.64	Core size:	NQ
Easting:	582,488.31	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(2).

FROM	TO	Description
0.00	3.15	OVERBURDEN
3.15	6.28	KIMBERLITE BRECCIA - Greenish-grey, partially oxidized kimberlite with abundant small olivine (<2mm) and ~20% sedimentary country rock xenoliths, including siltstone and shale. Abundant lapilli (15%) are also present, many with rounded to euhedral olivine cores, with a brown, fine-grained groundmass. Macrocrysts are abundant as well (20%), and occur as serpentine and magnetite pseudomorphs.
6.28	115.00	BEDDED KIMBERLITE - Fine and medium grained, bedded volcaniclastic kimberlite, often displaying well-developed laminated textures with beds of 1 - 15mm. Beds are generally at 60° TCA or more and are particularly well-defined when interstitial carbonate is present. Grains are matrix-supported but still closely packed. The rock is comprised of dominantly olivine (50 - 60 %) with much lesser ameboidal lapilli and xenoliths. Occasional coarser beds may show a heterogeneous assemblage of poorly sorted small olivine, larger macrocrysts, relatively abundant xenoliths (5%), and lapilli, similar in general to the breccia unit at the top of the hole. Above ~82m, the kimberlite may be moderately oxidized, though local banding is present below this level. Bedding becomes less well-defined with depth.
115.00	115.20	MUDSTONE -Grey. EOH @ 115.20m.

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DDH # : 5A-5

Property:	BUFFALO HILLS	Start date:	July 31, 1997
Claim name:	91-11-14-7-5	End date:	August 4, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	682.98	Hole Length:	90.52
Anomaly # :	5A(3)	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,306,058.30	Core size:	HQ
Easting:	582,333.04	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(3).

FROM	TO	Description
0.00	8.53	OVERBURDEN - Shale, granite, limestone and carbonate pebbles to cobbles in a mud matrix.
8.53	17.37	KIMBERLITE BRECCIA - Macrocrystic, lapilli-bearing volcaniclastic kimberlite breccia with common single olivine crystals (0.2-4mm), ameboidal lapilli, sedimentary country rock xenoliths and sub-angular to angular volcaniclastic kimberlite autoliths. The interclast matrix is comprised of serpentine and carbonate.
17.37	78.33	BEDDED KIMBERLITE - Bedded, olivine-rich volcaniclastic kimberlite with intermittent breccia horizons (up to 1.5m thick). Dominant textures are horizontal to sub-horizontal due to the consistently observable bedding and the orientation of clasts within breccia beds. Sub-horizontal orientations are more common with depth. With the main exception of the breccia horizons where clasts sizes are medium and fine grained, grain size is generally fine and the rock is dominated by small (<1mm to 1mm), single olivine crystals (50%) with 5-10% country rock xenoliths, concentrated in beds, ameboidal lapilli (2%) and occasional macrocrysts (1%), both found in coarser beds also. Carbonate content is moderate and oxidation staining is low to moderate. The matrix is composed of serpentine with variable amounts of (often coarse) carbonate.
78.33	90.52	RESEDIMENTED(?) KIMBERLITE - Volcaniclastic kimberlite dominated by undulating, vertical and subvertical fabrics where bedded kimberlite has been deformed and/or faulted, displaying disrupted beds. The kimberlite is comprised of fine grained olivine of average size 0.5mm, interstitial to small (<1cm), angular black shale clasts which define beds. The olivines are closely packed though remain matrix supported. Rare macrocrysts and lapilli occur. At 82.20m a 10cm interval of grey clay is present. EOH @ 90.52m.

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DDH # : 5A-6

Property:	BUFFALO HILLS	Start date:	August 4, 1997
Claim name:	91-11-14-7-5	End date:	August 5, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	683.14	Hole Length:	96.62
Anomaly # :	5A(3)	Azimuth at Collar:	90.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,306,058.31	Core size:	HQ
Easting:	582,334.34	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(3).

FROM	TO	Description
0.00	8.63	OVERBURDEN - Granitic clasts, clay supported.
8.63	20.72	KIMBERLITE BRECCIA - Macrocrystic, lapilli-bearing volcaniclastic kimberlite breccia, rich in carbonate xenoliths and single grains of olivine.
20.72	87.67	BEDDED KIMBERLITE -Bedded, olivine-rich volcaniclastic kimberlite with intermittent breccia horizons (up to 2.9m thick). Dominant bedding fabrics are at ~45° TCA, and are consistently observable especially where clasts within breccia beds are orientated subparallel to one another. Bedding contacts are generally not sharp but are defined by changes in grain size. With the main exception of the breccia horizons where clasts sizes are medium and coarse grained, grain size is generally fine and the rock is dominated by small (<1mm to 1mm), single olivine crystals (50%) with 5-10% crustal xenoliths, concentrated in beds, ameboidal lapilli (3%) and occasional macrocrysts (2%), both found in coarser beds also. Carbonate content is moderate and oxidation staining is low to moderate. The matrix is comprised of serpentine with variable amounts of (often coarse) carbonate. Occasional normally bedded sequences can be observed.
87.67	96.62	SHALE & MUDSTONE - Alternating shale and mudstone beds, with calcite veining between 90.37 and 90.57m. "Altered" mudstone from 95.00-96.62m. EOH @ 96.62m.

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DDH # : 5A-7

Property:	BUFFALO HILLS	Start date:	August 3, 1997
Claim name:	91-11-14-10-5	End date:	August 5, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	687.53	Hole Length:	127.10
Anomaly # :	5A(2)	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,306,213.85	Core size:	H-N
Easting:	582,488.39	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(2).

FROM	TO	Description
0.00	4.50	OVERBURDEN - Mudstone with shale, limestone and granitic pebbles.
4.50	7.80	KIMBERLITE BRECCIA - Greyish and somewhat oxidized volcaniclastic kimberlite with ~20% crustal xenoliths and with abundant lapilli (which contain euhedral olivine of <1mm to1mm in size), abundant macrocrysts and lesser single olivines (~1mm) in a serpentine matrix. Lapilli reach 15mm and xenoliths 20mm. Crustal xenoliths display a weak clast orientation at 40° TCA. Some coarse grained carbonate is present in the matrix. Small amounts of magnetite may be present in pseudomorphed olivines.
7.80	118.50	BEDDED KIMBERLITE - Well-bedded, olivine-rich volcaniclastic kimberlite with intervals of matrix supported kimberlite breccia. Definition of bedding is aided by the subparallel alignment of elongate crustal xenoliths, which range in size from 1-15mm. Grain size between breccia layers is generally fine and medium grained and here olivine is the main constituent of the rock (~50%). Graded bedding is sometimes present. Dominant bedding angles are at 55-60° TCA. In fine beds lapilli and macrocrysts are rare and in coarser beds these can be relatively abundant, 20% and 10% respectively.
118.50	121.01	SHALE -With extreme carbonate veining or fracture fill.
121.01	127.10	MUDSTONE - Grey. EOH @ 127.10m.

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DDH # : 5A-8

Property:	BUFFALO HILLS	Start date:	August 5, 1997
Claim name:	91-11-14-10-5	End date:	August 6, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	687.59	Hole Length:	127.10
Anomaly # :	5A(2)	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-80.00
Northing:	6,306,212.80	Core size:	HQ
Easting:	582,488.52	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(2).

FROM	TO	Description
0.00	3.96	OVERBURDEN
3.96	6.28	KIMBERLITE BRECCIA - Greyish and somewhat oxidized kimberlite with ~20% country rock xenoliths and with abundant lapilli (which contain euhedral olivine of <1mm to1mm in size) and abundant macrocrysts with lesser single olivines (~1mm) in a serpentine matrix. Lapilli reach 15mm and xenoliths 20mm. Some coarse grained carbonate in the matrix, small amounts of magnetite in pseudomorphed olivines.
6.28	113.91	BEDDED KIMBERLITE - Fine to medium grained, well bedded and sometimes laminated volcaniclastic kimberlite. Laminate beds are 3mm to 10cm thick. Beds generally contain dominantly single olivine grains (50-60%) with 0-10% lapilli, 0-5%macrocrysts, and <5% crustal xenoliths, where interbedded coarser breccia beds contain the higher concentrations of crustal xenoliths (up to 1cm), lapilli and macrocrysts. Bedding is at ~45° TCA. Below 51.65m, laminar textures are replaced by more massive beds and these are more poorly sorted. As is common elsewhere in this kimberlite, oxidization is common but may show distinct pathways between areas with unaltered olivines, which have retained their greenish-grey colour.
113.91	120.35	KIMBERLITE BRECCIA -Kimberlite contains abundant small (avg 4mm) crustal xenoliths (~30%) of dominantly white and grey limestone. This breccia is quite well sorted and shows a weak clast orientation at 55° TCA. Other components are 10% lapilli (avg 4mm), 20% macrocrysts (avg 3mm) and abundant small olivine microcrysts of ~1mm or less. Oxidation is moderate to high throughout this interval.
120.35	127.10	SHALE & MUDSTONE -Calcite veins/fracture fill (at 30-45° TCA) and brecciation in shale. Mudstone may be uncompact. EOH @ 127.10m.

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DDH # : 5A-9

Property:	BUFFALO HILLS	Start date:	August 5, 1997
Claim name:	91-11-14-2-5	End date:	August 6, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	659.08	Hole Length:	72.26
Anomaly # :	5A(4)	Azimuth at Collar:	0.00
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,305,766.65	Core size:	HQ
Easting:	582,442.32	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(4).

FROM	TO	Description
0.00	56.99	OVERBURDEN - Mudstone down to 41.76m, sand from 41.76m to 53.95m, granitic pebbles to cobbles down to 56.99m.
56.99	68.10	KIMBERLITE BRECCIA -Medium and coarse grained volcaniclastic kimberlite with up to 40% crustal xenoliths (limestone, shale) and lapilli (10%) set in an olivine-rich matrix (macrocrysts 10% and microcrysts of <1mm 40%). Crustal xenoliths range from 1-20mm and macrocrysts from 3-5mm. Textures are matrix supported and chaotic and the core has an overall weathered look. Olivines have been only partially pseudomorphed and some have magnetite cores. A fine grained area with non-breccia concentrations of country rock xenoliths occurs at 64.05-65.50m. -From 63.39-64.05m, 65.50-66.14m and 66.44-67.14m, "degassing" breccia zones occur where angular kimberlite clasts are suspended in a carbonate and fine detritus matrix (kimberlitic grains and clasts). These breccia clasts (autoliths) appear to be derived from the surrounding kimberlite or a similar kimberlite as textural and compositional features are the same, and it may be that these autoliths are not far-travelled. In the intervals 65.50-66.14m & 66.44-67.14m, another 20% of the autoliths are of a different type of volcaniclastic kimberlite, in which black shale xenoliths are common.
68.10	72.26	MUDSTONE EOH @ 72.26m.

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DDH # : 5A-10

Property:	BUFFALO HILLS	Start date:	August 7, 1997
Claim name:	91-11-14-10-5	End date:	August 9, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON, MM
Elevation:	688.48	Hole Length:	154.53
Anomaly # :	5A(2)	Azimuth at Collar:	45.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,306,216.88	Core size:	HQ
Easting:	582,489.78	Measure. units:	M
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 5A(2). Core size changes from HQ to NQ at 86.20m

FROM	TO	Description
0.00	3.96	OVERBURDEN
3.96	6.90	KIMBERLITE BRECCIA -Volcaniclastic kimberlite breccia with 20% xenoliths (brown siltstone and black shale dominantly), 5% lapilli and 30% olivine (macrocrysts and microcrysts). Macrocrysts reach 4mm and may be broken. Abundant microcrysts form the interstitial groundmass to the larger clasts. Carbonate and serpentine are interstitial to the microcrysts.
6.90	123.70	BEDDED KIMBERLITE -Fine and medium grained volcaniclastic kimberlite with well-defined bedding at 85° TCA. Rock may be comprised of up to 70% very fine grained olivine of avg size 0.3mm in a serpentine and sometimes carbonate matrix. Occasional lapilli, xenoliths and macrocrysts occur. Intermittent coarser beds occur, including breccia beds, and concentration of lapilli, xenoliths and macrocrysts increase in such beds. Textures are normally matrix supported but may be grain supported locally.
123.70	139.29	KIMBERLITE BRECCIA -Medium to coarse grained volcaniclastic kimberlite breccia which is enriched in country rock xenoliths, particulary limestone, giving the kimberlite a greyish blue hue. This kimberlite is more poorly sorted than the kimberlite above it, and is densely packed and moderately oxidized. The uppermost 2m do not contain breccia concentrations of xenoliths, but do form a continuum with the limestone-rich kimberlite below, where concentrations vary with grain size but are >15%. Elongate clasts define a bedding fabric of 70-80° TCA. Xenoliths at the top of the interval average 7mm and at the bottom 2cm (with a maximum of 4cm), possibly defining an overall graded sequence. Rounded macrocrysts of avg 3mm to 7mm are common to abundant and ameboidal lapilli of similar sizes are also common. Smaller olivine microcrysts of <1mm are also common. (Percentages vary with concentration o xenoliths.)

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FROM	TO	Description
139.29	154.53	MUDSTONE -Grey, with some intervals of lithified grey shale. EOH @ 154.53m. Roto dip test: -58°.

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DDH # : 5B-1

Property:	BUFFALO HILLS	Start date:	February 9, 1997
Claim name:	91-11-14-9-5	End date:	February 11, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	J. WARD
Elevation:	633.56	Hole Length:	148.43
Anomaly # :	5B	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,306,408.37	Core size:	NQ
Easting:	582,812.16	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: Test mag high feature.

FROM	TO	Description
0.00	49.70	OVERBURDEN
49.70	127.80	KIMBERLITE - Rock is medium grey buff to dark grey-green. It is composed of 55%-70% olivine crystals, these crystals are well rounded, for the most part equigranular and range from 1mm to ~10mm. - Olivine crystals appear to be serpentinized and contain magnetite in their cores. There seems to be a small amount of sulfide replacement in the rock and possible ilmenites (<<1% 1-2mm rounded). Also <1% phlogopite, black to bronze, rounded and a fraction of a mm in size. Xenoliths range in size from 1mm to 50mm and consist of limestone, granite and shale. The xeno's are subrounded to angular, some are arcuate and the odd xeno has a reaction rim. Thin carbonate veining is evident at ~121.61m. Some finer grained "autoliths" are also exhibited. The remaining 30-45% of the rock is composed of a medium to dark green fine grained serpentine matrix.
127.80	148.43	MUDSTONE & KIMBERLITE - From 127.80m to 148.43m the core consists of a fine grained mudstone. The rock is competent and recovery is upwards of 90%. 128.10m Serpentinized kimberlite dyke?, clay matrix. 134.50-134.96m Kimberlite dyke? Serpentine and clay matrix. EOH @ 148.43m.

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DDH # : 5B-2

Property:	BUFFALO HILLS	Start date:	February 11, 1997
Claim name:	91-11-14-9-5	End date:	February 13, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	J. WARD
Elevation:	633.56	Hole Length:	142.33
Anomaly # :	5B	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,306,408.37	Core size:	NQ
Easting:	582,812.16	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 5B.

FROM	TO	Description
0.00	55.80	OVERBURDEN
55.80	129.64	KIMBERLITE - Rock is med grey green to dark grey green in fresh sections and medium buff colored in weathered sections. Top section is moderately magnetic. - Rock is composed of 65-70% olivine crystals. These xls are rounded and range from ~0.1mm to 10mm but for the most part the core is equigranular. In the top section olivine crystals are rusty brown in color (ankerite?). Olivine crystals are also serpentinized and the core contains magnetite. Many olivines xls contain carbonate also. The odd autolith is visible throughout the core. - Carbonate, shale, greywacke and granitic xenoliths range from 0.5mm to 25mm, are angular to subrounded, some are arcuate, also some xeno's exhibit reaction rims. Small pods of chromite (?) seem to be evenly dispersed throughout the core. - The remaining 30-35% of the rock consists of a fine grained medium green serpentine matrix.
129.64	142.33	MUDSTONE - From 129.64m to 142.33m the core consists of a fine grained mudstone. EOH @ 142.33m.

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DDH # : 6-1

Property:	BUFFALO HILLS	Start date:	January 30, 1997
Claim name:	91-10-30-3-5	End date:	February 1, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	D. STRICKLAND
Elevation:	583.31	Hole Length:	200.25
Anomaly # :	6(1)	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,308,732.15	Core size:	NQ
Easting:	585,262.52	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 6(1).

FROM	TO	Description
0.00	13.40	OVERBURDEN
13.40	200.25	KIMBERLITE - Volcaniclastic kimberlite is dark grey-green to buff grey in colour. It is composed of 65-75% subrounded to round equigranular olivine grains. - Olivine grains range from 0.2 to 5mm in size, are serpentinized and have magnetite in their cores between 24m and 27m. Near the top of the core altered olivines are rusty in color (ankerite?). - The remaining 25-35% of the rock is composed of a fine grained serpentine matrix which is medium to dark green in colour. Granitic, carbonate, shale and sandstone(?) xenoliths, angular to subrounded, range in size from 0.5 to 4.5cm and become more abundant with depth. - Reaction halos are present around a few shale xenoliths. - Autoliths, initially observed at approximately the 51m mark, increase in abundance with depth. - Some sulfide replacement is observed. EOH @ 200.25m.

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DDH # : 6-2

Property:	BUFFALO HILLS	Start date:	February 1, 1997
Claim name:	91-10-19-15-5	End date:	February 3, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	ROB JOHNSON
Elevation:	574.33	Hole Length:	138.70
Anomaly # :	6(2)	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,308,382.71	Core size:	NQ
Easting:	585,550.18	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: To test anomaly 6(2).

FROM	TO	Description
0.00	74.40	OVERBURDEN
74.40	127.00	KIMBERLITE - Volcaniclastic kimberlite is dark grey green to light grey green in fresh sections and light rusty buff in the top section. Rock is composed of 65-70% olivine crystals. - Olivine crystals range from 0.5mm to 3mm but the rock is more or less equigranular. Olivines are rounded and seem to be serpentinized with magnetite in their cores. - At top section the cores of the olivine crystals are rusty brown (ankerite?). - The remaining 30-35% of the rock is composed of a fine grained serpentine matrix. However in some sections of the core fine grained carbonate composes 5-7% of the core. Black to bronze phlogopites to ~1mm are observed. - Granitic, carbonate, shale and sandstone(?) xenoliths are observed throughout the core (but are absent from 82.9m to 94.5m). Xenoliths are rounded to subangular and reaction halo's are absent. - Autoliths observed range from 5mm-15mm. Between 111.9m and 121m the rock's physical appearance changes, in this section it is badly weathered. Xenoliths are still observed. - From 121m to 127m the kimberlite is fresh.
127.00	138.70	MUDSTONE - Unlithified mudstone. EOH @ 138.70m.

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DDH # : 6-3

Property:	BUFFALO HILLS	Start date:	August 10, 1997
Claim name:	91-10-30-3-5	End date:	August 12, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	583.36	Hole Length:	182.88
Anomaly # :	6(1)	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,308,730.52	Core size:	HQ
Easting:	585,263.40	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6.

FROM	TO	Description
0.00	12.25	OVERBURDEN - Small, mainly granitic cobbles in a clay matrix.
12.25	176.88	KIMBERLITE - Olivine crystal tuff, more altered in the uppermost 12m. Rock is grey-buff to dark grey-green depending on alteration, and fine an medium grained. Round or fragmented olivine crystals, partially or wholly altered to serpentine with magnetite and/or calcite cores, make up 60-70% of the rock. 2-6mm very angular to angular and arcuate shale and limestone xenoliths, some with halos, comprise ~1-5% of the rock. Lapilli (<30%) are subrounded to irregular in shape and 2-15mm in size. Some are cored by olivine or xenoliths. The remaining 29-39% of the rock is composed of a light rusty brown cryptocrystalline serpentine-carbonate matrix. Occasional graded beds (at ~ 15° TCA) can be observed throughout the unit. A few dark red garnets are present. Carbonate veining is locally common. Concentrations of xenoltihs and lapilli vary with changes in grain size, generally increasing in abundance where grain sizes are larger. Sometimes a weak clast orientation amongst these features can be observed (45° TCA).
176.88	182.88	MUDSTONE -Lithified mud. EOH @ 182.88m.

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DDH # : 6-4

Property:	BUFFALO HILLS	Start date:	August 12, 1997
Claim name:	91-10-30-3-5	End date:	August 13, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	583.28	Hole Length:	111.86
Anomaly # :	6(1)	Azimuth at Collar:	360.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,308,733.04	Core size:	HQ
Easting:	585,270.00	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6.

FROM	TO	Description
0.00	14.05	OVERBURDEN - Kimberlite and granitic cobble-sized clasts in a clay matrix.
14.05	104.30	KIMBERLITE - Volcaniclastic kimberlite is light buff-grey in colour and may be either fine, medium or coarse grained. Rounded to sub-angluar and fragmented olivine crystals are generally serpentinized and many have magnetite cores. Two distinctive populations of olivine are present: 0.1-0.2mm sized which are rust coloured and 1-6mm sized which are greyish. The small olivines are abundant, and overall olivine comprises up to 60% of the kimberlite. Shale xenoliths are the most common xenolith type and are often needle-shaped or angular, some with halos (<1%). They may range up to an average size of 25mm. Lapilli are present throughout the hole in varying degrees, sometimes in as much as 30% abundance. They may be rounded, irregularly-shaped, and/or broken, and with or without cores. The matrix consists of serpentine and carbonate. From 71.1-97.7m the kimberlite is very coarse grained with up to 10cm granitic, carbonate, shale and mantle nodules comprising 20% of the rock. Olivine comprises another 60% with the remainder being matrix.
104.30	111.86	MUDSTONE - Partially lithified. EOH @ 111.86m.

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DDH # : 6-5

Property:	BUFFALO HILLS	Start date:	August 13, 1997
Claim name:	91-10-30-3-5	End date:	August 15, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	583.28	Hole Length:	217.30
Anomaly # :	6(1)	Azimuth at Collar:	90.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,308,732.15	Core size:	HQ
Easting:	585,262.52	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6.

FROM	TO	Description
0.00	11.43	OVERBURDEN - Small pebble to small cobble sized granitic & kimberlitic clasts in a clay matrix.
11.43	213.20	KIMBERLITE - Volcaniclastic kimberlite which alternates between fine, medium and coarse grain sizes over intervals of 5 to 42m. Buff-grey to light grey-green, generally well-sorted and moderately equigranular. Olivines compose 50-60% of the rock and are rounded and irregular in shape. Some are fragmented. Often the olivines are rusty coloured due to limonitic alteration but otherwise are grey green and serpentinized. Sizes range between 1 and 10mm. Rounded to subrounded and fragmented lapilli (2-20mm) comprise 1-20% of the rock, some have olivine cores. Xenoliths are subrounded to angular shale of 2-40mm size and comprise 1-2% of the rock. The remaining rock component is an aphanitic pale green to white matrix. Constituent concentrations vary based on grain size with an increased abundance of larger clasts such as lapilli and macrocrysts in coarser-grained areas. Mantle xenoliths are intermittently present. - Near the end of the hole short intervals of partially lithified mudstone occur: 206.70-207.90m, 211.40-212.75m.
213.20	217.30	MUDSTONE - Partially lithified. EOH @ 217.30m.

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DDH # : 6-6

Property:	BUFFALO HILLS	Start date:	August 15, 1997
Claim name:	91-10-30-3-5	End date:	August 16, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	583.37	Hole Length:	133.20
Anomaly # :	6(1)	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-70.00
Northing:	6,308,732.49	Core size:	H-N
Easting:	585,262.10	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6.

FROM	TO	Description
0.00	11.00	OVERBURDEN - Fine to medium sized cobbles in a clay matrix. Clast lithologies are limestone, granite, siltstone and the odd kimberlite clast.
11.00	125.60	KIMBERLITE - Volcaniclastic kimberlite is buff-grey, well-sorted, generally fine and medium grained, and closely packed, though not always grain-supported. Olivines comprise 55-70% of the rock, with the remaining percentage occurring as occasional lapilli (up to 3% and to 10mm) and a cryptocrystalline serpentine-carbonate matrix. Graded bedding can be observed occasionally. Grain sizes alternate on the scale of every 10-50m. From 72.5-121.92m, grain size and proportions of olivine, lapilli and xenoliths increase and mantle xenoliths are observed containing garnets, chromites and chrome diopsides, chromite and ilmenite(?).
125.60	133.20	MUDSTONE - With fish scales. EOH @ 133.20m.

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DDH # : 6-7

Property:	BUFFALO HILLS	Start date:	August 20, 1997
Claim name:	91-10-19-15-5	End date:	August 22, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	574.29	Hole Length:	160.62
Anomaly # :	6(2)	Azimuth at Collar:	360.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,308,383.01	Core size:	NQ
Easting:	585,549.52	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 6(2).

FROM	TO	Description
0.00	85.50	OVERBURDEN - Fine sand to medium cobbles in a clay matrix.
85.50	99.97	KIMBERLITE - Volcaniclastic kimberlite, fine to medium grained, green-grey, well-sorted and equigranular. Olivine crystals, round to elliptical, range in size from 0.5-0.8mm and another population ranges between 3-5mm. The later group are more abundant (comprising 40% of the rock), are serpentinized, and have magnetite in their cores. Carbonate, shale and limestone xenoliths are round or irregular in shape, and range from 7-40mm, but comprise <<1% of the rock. Round and elliptical ameboid lapilli of 7 to 20mm are observed, but are also present in low numbers <<1%. The remaining 40% of the rock is composed of a medium green, cryptocrystalline serpentine matrix with local areas of abundant carbonate. From 98.8-99.4m, strong layering at 53° TCA is present. The bottom contact with the mudstone is gradational with xenoliths of mud in the kimberlite.
99.97	118.72	MUDSTONE - Mudstone with minor sulfides and small white chemical(?) staining. Minor sulfides (py)are present. Lower contact with kimberlite is sharp and at 90° TCA.
118.72	154.76	KIMBERLITE - Same as kimberlite from 85.50-99.97m, though overall grain size increases and xenolith sizes increase locally. Bedding is less pronounced. A 1.5m mudstone occurrence is present at 146.1m.
154.76	160.62	MUDSTONE - Partially lithified mudstone. EOH @ 160.62.

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DDH # : 6-8

Property:	BUFFALO HILLS	Start date:	August 23, 1997
Claim name:	91-10-19-15-5	End date:	August 25, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	574.31	Hole Length:	150.90
Anomaly # :	6(2)	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-60.00
Northing:	6,308,381.95	Core size:	HQ
Easting:	585,549.68	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test K6.

FROM	TO	Description
0.00	94.30	OVERBURDEN - Granitoid, limestone and sandstone cobbles in a clay matrix with 3m section of coarse sand from 44.8-47.9m.
94.30	112.40	KIMBERLITE - Volcaniclastic kimberlite with two populations of olivine: small, phenocrystal olivine of < 1mm (30% of rock volume), and macrocrystal olivine from 2-15mm (15% of the rock volume). Angular and irreglarly shaped limestone, shale and carbonate xenoliths, some haloed, range up to 10mm and comprise <1% of the rock. Lapilli are rounded, 5-10mm, and often have a distinctive internal concentric arrangement of minerals. Rarely, small, irregularly-shaped autoliths are present. Together, lapilli and autoliths only comprise <<1%. Microcrysts of phlogopite occur throughout the intersection. The remaining ~55% of the rock is composed of a medium-green, cryptocrystalline serpentine matrix. Locally 10-20% of the matrix is composed of carbonate.
112.40	122.60	MUDSTONE - Partially lithified, contacts with kimberlite not preserved.
122.60	127.30	KIMBERLITE - Same as kimberlite above.
127.30	149.00	KIMBERLITE BRECCIA - Same as kimberlite above except that here breccia conditions prevail, with ~20% xenoliths of angular to subrounded carbonate, limestone, siltstone and mantle material of up to 10cm. Locally, large, well-rounded lapilli are also present. The bottom 0.7m of this section are extremely weathered.
149.00	150.90	MUDSTONE - Unlithified mud. EOH @ 150.9m.

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UNTIL

DDH # : 6-9

Property:	BUFFALO HILLS	Start date:	August 25, 1997
Claim name:	91-10-19-15-5	End date:	August 26, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	574.31	Hole Length:	30.48
Anomaly # :	6(2)	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-75.00
Northing:	6,308,382.71	Core size:	HQ
Easting:	585,550.18	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6.

FROM	TO	Description
0.00	30.48	OVERBURDEN - No recovery. EOH @ 30.48m due to hole failure in overburden.

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DDH # : 6-10

Property:	BUFFALO HILLS	Start date:	August 26, 1997
Claim name:	91-10-19-15-5	End date:	August 28, 1997
Claim number:	9396060049	Contractor:	CONNERS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	574.31	Hole Length:	197.20
Anomaly # :	6(2)	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-75.00
Northing:	6,308,382.71	Core size:	H-N
Easting:	585,550.18	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6 at the same location as failed hole 6-9.

FROM	TO	Description
0.00	85.80	OVERBURDEN - Silt to large pebbles, granite, siltstone and limestone in a clay matrix.
85.80	94.80	KIMBERLITE - Volcaniclastic kimberlite is dark grey-green and predominantly fine-grained. Rounded to elliptical olivine crystals are present in two size populations. The smaller population ranges in size from 0.2-1mm and the larger from 3-10mm. Both populations are dark grey-green to white in their interiors, are partially serpentinized and together comprise 50% of the rock. Infrequent small, 5mm, shale xenoliths occur. The remaining 50% of the rock is composed of a dark green cryptocrystalline serpentine-carbonate matrix. Pyrite replacement throughout.
94.80	103.30	MUDSTONE - Partially lithified.
103.30	142.00	KIMBERLITE - Same kimberlite as described above.
142.00	158.20	COARSE-GRAINED KIMBERLITE - Dark grey-green, volcaniclastic kimberlite with abundant round to subround olivine crystals of 2-5mm size, comprising 30-35% of the rock. Angular to subround carbonate, limestone, shale and mantle xenoliths, some with reaction halos, range in size from 3-30mm and compose ~5% of the rock. Rounded to irregular-shaped lapilli compose ~10% and are 4-15mm. Occasional autoliths of a similar size occur. Where the rock is not clast-supported, a matrix of cryptocrystalline serpentine and carbonate composes 50-55% of the rock.
158.20	165.20	KIMBERLITE - Same as kimberlite from 103.3-142.0m.
165.20	197.20	MUDSTONE - Partially lithified with some sandy layers. EOH @ 197.20m.

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UNTIL

DDH # : 6-11

Property:	BUFFALO HILLS	Start date:	August 30, 1997
Claim name:	91-10-19-15-5	End date:	August 30, 1997
Claim number:	9396060049	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	574.31	Hole Length:	45.72
Anomaly # :	6(2)	Azimuth at Collar:	90.00
UTM zone:	11	Incline at Collar:	-80.00
Northing:	6,308,382.71	Core size:	PQ
Easting:	585,550.18	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K6.

FROM	TO	Description
0.00	45.72	OVERBURDEN - No recovery. EOH @ 45.72m due to hole failure in overburden.

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UNTIL

DDH # : 7A-1

Property:	BUFFALO HILLS	Start date:	January 28, 1997
Claim name:	91-11-36-11-5	End date:	January 30, 1997
Claim number:	9396060050	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	DAVE SKELTON
Elevation:	620.30	Hole Length:	200.25
Anomaly # :	7A	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,311,235.65	Core size:	NQ
Easting:	583,261.72	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: TO TEST A MAGNETIC HIGH ANOMALY (7A)

FROM	TO	Description
0.00	69.20	OVERBURDEN - Sand, gravel and clay. At 120' there was a minor artesian flow.
69.20	200.25	KIMBERLITE BRECCIA - Magnetic susceptibility is highest at the top of the DDH. The kimberlite contains 60-70% olivine, which has been resorbed and is quite rounded. All of the grains exhibit white rims and appear to have been replaced. Magnetite has replaced some of the grains. Serpentine in material is 20-30%. Pyrite is seen throughout as replacement of olivine (especially towards the bottom of the hole) and as a component of the material. - Autoliths are common at the top of the hole, becoming more difficult to identify towards the bottom of the hole. The autoliths can contain 5-10% phlogopite, however there appears to be several generation of autoliths - some of which contain no mica. The phlogopite bearing autoliths are usually more fine grained. Fresh olivine is present in some of the coarse grained autoliths. - Xenoliths are small and are generally not common (<3cm). They appear quite angular and exhibit few alteration halos. Xenoliths are sedimentary and include mostly limestone? (greenish). EOH @ 200.25m.

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DDH # : 7B-1

Property:	BUFFALO HILLS	Start date:	January 17, 1997
Claim name:	92-11-1-4-5	End date:	January 21, 1997
Claim number:	9396060058	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	DAVE SKELTON
Elevation:	622.59	Hole Length:	154.53
Anomaly # :	7B	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,312,089.27	Core size:	NQ
Easting:	583,131.36	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: TEST MAG HIGH FEATURE

FROM	TO	Description
0.00	34.70	OVERBURDEN - Light colored clay containing only a few pebbles.
34.70	154.53	KIMBERLITE BRECCIA - Green to green black. Olivine rich breccia pipe - 60-90% olivine with the remaining components comprising xenoliths, carbonate, serpentine and a few oxides. - Olivine grains are resorbed and many exhibit fresh surfaces, especially towards the top of the section. - The olivine grains are generally small (1-3mm) and are found throughout the hole. Py is present as blebs up to 1cm. Carbonate/zeolite replacement is common. - Xenoliths are 0.1 to 50mm in size with the majority approximately 1-2cm. Lithologies include limestone, shale, greywacke, and sandstone. These xenoliths can have reaction rims (especially the limestone). - Autoliths are also very common and can be seen containing xenoliths as well. - The rocks are heavily fractured and broken throughout, generally at 45° TCA and contain many clay seams (<6"). The clay is blue to green to light green. EOH @ 154.53m.

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DDH # : 7C-1

Property:	BUFFALO HILLS	Start date:	January 21, 1997
Claim name:	92-11-1-5-5	End date:	January 24, 1997
Claim number:	9396060058	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	DAVE SKELTON
Elevation:	620.31	Hole Length:	92.05
Anomaly # :	7C	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,312,455.15	Core size:	NQ
Easting:	583,052.93	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: TO TEST A MAG HIGH ANOMALY

FROM	TO	Description
0.00	37.20	OVERBURDEN - Clay with a few pebbles. Lots of water (artesianal flow at bedrock).
37.20	92.05	KIMBERLITE - Rock is buff colored - light grey to beige brown. - Original texture is often difficult to discern due to the high degree of alteration - rock is very bleached. - Rock is very crumbled and broken in sections while other sections are quite competent. - Alteration is pervasive. Autoliths are present and country rock xenoliths are small and not common (<5cm). Both the autoliths and xenoliths have been altered. - Relict olivine is present (grains < 5mm) and have been completely replaced. Olivine was approx 60-70%. - Hydrocarbons visible on some fracture surfaces as black patchy coating (never a measurable thickness). No mica or oxides visible. - Core often has a sandy, grainy feel. - Below 61.60m the kimberlite is fresher than above and exhibits green-grey colour. 30% fresh olivine retained. Core is more competent in general below this depth. EOH @ 92.05m.

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DDH # : 14-1

Property: BUFFALO HILLS
Claim name: 92-11-12-13-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: January 24, 1997
End date: January 27, 1997
Contractor: CONNORS
Geologist: DAVE SKELTON

Elevation: 620.72
Anomaly # : 14
UTM zone: 11
Northing: 6,315,049.84
Easting: 582,882.92
Permit # : MME-961552

Hole Length: 200.00
Azimuth at Collar:
Incline at Collar: -90.00
Core size: NQ
Measure. units: m

Purpose of Hole: TO TEST A MAG HIGH.

FROM	TO	Description
0.00	7.00	OVERBURDEN
7.00	200.00	KIMBERLITE - Grey green in color - some light and dark sections; 60-70% olivine - grains are rounded and equigranular (2-3mm). - Olivine is serpentinized and may have magnetite cores. - Remaining 25-30% is a serpentine matrix. - Lapilli are common. - Xenoliths are small (<5cm) and are composed of sandstone, limestone shale. EOH @ 200.00m.

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DDH # : 14-2

Property:	BUFFALO HILLS	Start date:	August 8, 1997
Claim name:	92-11-12-13-5	End date:	August 11, 1997
Claim number:	9396060058	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	621.20	Hole Length:	230.72
Anomaly # :	14	Azimuth at Collar:	360.00
UTM zone:	11	Incline at Collar:	-57.00
Northing:	6,315,054.25	Core size:	HQ
Easting:	582,883.00	Measure. units:	m
Permit # :	MME-961552		

Purpose of Hole: Continue testing K14.

FROM	TO	Description
0.00	7.40	OVERBURDEN - Kimberlite, shale and granite clasts in brown mud.
7.40	230.72	KIMBERLITE - Green, macrocrystic and lapilli-rich volcaniclastic kimberlite with 40-50% macrocrysts and 30-40% lapilli in a serpentinized matrix. Groundmass olivines of <1mm are also present. Grain size ranges from coarse to fine grained, proportion and size of xenoliths and lapilli are variable downhole. Sorting is generally moderate to good. There is an increase in mantle nodules downhole. Limestone, shale and carbonate clasts are present but not abundant. Oxidation of olivines is present locally, changing the overall colour to an orangish-grey. Calcite veining increases with depth, calcite overloading occurs near the end of the hole. EOH @ 230.72m.

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DDH # : 14-3

Property:	BUFFALO HILLS	Start date:	August 11, 1997
Claim name:	92-11-12-13-5	End date:	August 14, 1997
Claim number:	9396060058	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	621.00	Hole Length:	198.80
Anomaly # :	14	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-75.00
Northing:	6,315,049.84	Core size:	H-N
Easting:	582,882.92	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K14.

FROM	TO	Description
0.00	7.80	OVERBURDEN - Sand to large pebble sized clasts of granitic rock and kimberlite.
7.80	197.70	KIMBERLITE - Volcaniclastic kimberlite, fine to coarse grained, olivines make up ~45% of rock, lapilli and xenoliths compose 1% and 5% respectively. - Macrocrysts are the dominant feature of the rock, with most of the 45% olivine component occurring as macrocrysts. - Serp-carb matrix compose remaining portion of rock. - Proportions of xenoliths increase downhole.
197.70	198.80	MUDSTONE -Partially lithified. EOH @ 198.80m.

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DDH # : 14-4

Property:	BUFFALO HILLS	Start date:	August 15, 1997
Claim name:	92-11-12-13-5	End date:	August 17, 1997
Claim number:	9396060058	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	621.00	Hole Length:	197.20
Anomaly # :	14	Azimuth at Collar:	270.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,315,049.84	Core size:	H-N
Easting:	582,882.92	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K14.

FROM	TO	Description
0.00	5.18	OVERBURDEN - Poorly-sorted, well-rounded to subangular pebbles and cobbles of mainly granitic lithologies in a clay matrix.
5.18	193.40	KIMBERLITE - From 8.2m - 22.50m, volcaniclastic kimberlite is weathered, olivines are limonitized, crystals have rust brown margins. Macrocrysts are internally altered to serpentine and magnetite. Below 22.50m, the rock is less oxidized and a dark grey-green colour. - The entire intersection is generally homogeneous and consists of 45-55% olivine crystals, 45-55% serp-carb matrix, 1-2% xenoliths. Lapilli of size 5-40mm are also present, but comprise <1% of the rock. - Olivine macrocrysts particularly distinguish the rock and range in size from 2-10mm.
193.40	197.20	MUDSTONE -Partially lithified. EOH @ 197.20m.

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DDH # : 14-5

Property:	BUFFALO HILLS	Start date:	August 17, 1997
Claim name:	92-11-12-13-5	End date:	August 20, 1997
Claim number:	9396060058	Contractor:	CONNERS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	621.00	Hole Length:	255.12
Anomaly # :	14	Azimuth at Collar:	90.00
UTM zone:	11	Incline at Collar:	-59.00
Northing:	6,315,049.84	Core size:	H-N
Easting:	582,882.92	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To continue testing K14.

FROM	TO	Description
0.00	8.58	OVERBURDEN
8.58	251.30	KIMBERLITE - Essentially homogeneous volcaniclastic kimberlite which consists of 45-55% olivine crystals, 45-55% serp-carb matrix, 1-2% xenoliths. Local areas above 206.2m are very xenolith-poor. Lapilli of size 5-15mm are also present, but comprise ~1% of the rock. - Olivine macrocrysts particularly distinguish the rock and range in size from 2-10mm, though a microcryst population of olivines of <1mm is also present.
251.30	255.12	MUDSTONE - Partially lithified. EOH @ 255.12m.

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DDH # : 19-1

Property:	BUFFALO HILLS	Start date:	July 15, 1997
Claim name:	89-12-25-3-5	End date:	July 20, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON
Elevation:	735.94	Hole Length:	133.19
Anomaly # :	19	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,289,102.74	Core size:	HQ
Easting:	575,033.20	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 19.

FROM	TO	Description
0.00	5.09	OVERBURDEN
5.09	130.60	KIMBERLITE - Grey-brown volcaniclastic kimberlite with a fine grained granular matrix comprising up to 60 or 70% of the rock. Lapilli (up to 5cm) are present in small amounts of <1%. Groundmass and phenocrystal olivine constitute 20-30% of the rock. Brown macrocrysts reach 3mm. Also present are <1% black shale xenoliths (to 3cm), <1% limestone xenoliths (to 3.5cm), <1% chrome diopside, <1% pyrope (to 4mm), <1% chromite (1mm), wood fragments, mica and carbonate in the matrix.
130.60	133.19	MUDSTONE - Light grey mudstone with weakly developed parallel laminations and cross bedding. EOH @ 133.19m.

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DDH # : 19-2

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Property:	BUFFALO HILLS	Start date:	July 21, 1997
Claim name:	89-12-25-3-5	End date:	July 23, 1997
Claim number:	9396060035	Contractor:	CONNORS
Map NTS:	84B/13	Geologist:	R. JOHNSON

Elevation:	735.50	Hole Length:	90.50
Anomaly # :	19	Azimuth at Collar:	180.00
UTM zone:	11	Incline at Collar:	-58.00
Northing:	6,289,101.74	Core size:	HQ
Easting:	575,034.23	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: To test anomaly 19.

FROM	TO	Description
0.00	5.18	MIXED OVERBURDEN & KIMBERLITE - Clay with kimberlitic components and pebbles of granite and quartzite.
5.18	72.64	KIMBERLITE - Volcaniclastic kimberlite with varying grain size (fine, medium, coarse) and varying concentrations of the constituents olivine macrocrysts, lapilli, crustal xenoliths, wood and indicator minerals. From 5.18m to 20.52m the kimberlite is more highly weathered and is light grey. Occasional bedding can be seen, as at 38.21m, over a 50cm interval in fine grained material. Lapilli are abundant overall and may comprise 30% or more. Locally, olivine macrocrysts may comprise 50% of the rock. Crustal xenoliths do not comprise more than 15% in any area.
72.64	73.84	SANDSTONE - Convoluted bedding.
73.84	75.98	MIXED MUDSTONE & KIMBERLITE - Convoluted sandstone with wood fragments and chromite grains.
75.98	76.48	SANDSTONE & MUDSTONE
76.48	78.13	MIXED KIMBERLITE & MUDSTONE - Chrome diopside noted.
78.13	90.50	MUDSTONE - Compact, no laminations. EOH @ 90.5m. Roto dip test at 90.5m: -59°.

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DDH # : 19-3

Property: BUFFALO HILLS
Claim name: 89-12-25-3-5
Claim number: 9396060035
Map NTS: 84B/13

Start date: July 23, 1997
End date: July 28, 1997
Contractor: CONNORS
Geologist: R. JOHNSON

Elevation: 735.94
Anomaly # : 19
UTM zone: 11
Northing: 6,289,104.04
Easting: 575,034.19
Permit # : MME-970336

Hole Length: 204.51
Azimuth at Collar: 360.00
Incline at Collar: -58.00
Core size: HQ
Measure. units: m

Purpose of Hole: To continue testing K19.

FROM	TO	Description
0.00	3.66	OVERBURDEN
3.66	204.51	KIMBERLITE - Volcaniclastic kimberlite with varying grain size (fine, medium, coarse) and varying concentrations of the constituents olivine macrocrysts, lapilli, crustal xenoliths, mica, wood and indicator minerals. From 3.66-9.83m and 27.92-28.42m the kimberlite is more hightly weathered and is light grey. Lapilli are abundant overall and may comprise 30% or more. Olivine macrocrysts ma comprise 50% of the rock locally. Crustal xenolith concentrations of up to 50% in localized intervals constitute beccia layers. Intermittent mud and mud-sand layers occur but are generally thin and <1m. Calcite veining is common. From 142.33-166.88m, sand occurs within the kimberlite as free grains within the groundmass (10-50% of the groundmass). Beneath 166.88m, the kimberlite is commonly mud-rich and friable. EOH @ 204.51m.

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Reverse Circulation Drill Hole
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DDH # : RC6-1

Property: BUFFALO HILLS
Claim name: 3-30-91-10-5
Claim number: 9396060049
Map NTS: 84B/13

Start date: July 26, 1997
End date: July 26, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

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Elevation:
Anomaly # : 6
UTM zone: 11
Northing: 6,308,728.00
Easting: 585,228.00
Permit # : MME-970336

Hole Length: 27.43
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	27.43	OVERBURDEN EOH @ 27.43m.

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Reverse Circulation Drill Hole
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DDH # : RC6-2

Property:	BUFFALO HILLS	Start date:	July 27, 1997
Claim name:	3-30-91-10-5	End date:	July 27, 1997
Claim number:	9396060049	Contractor:	MIDNIGHT SUN
Map NTS:	84B/13	Geologist:	D. STRICKLAND
Elevation:		Hole Length:	9.14
Anomaly # :	6	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,308,731.00	Core size:	4"
Easting:	585,227.00	Measure. units:	m
Permit # :	MME-970336		

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Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	9.14	OVERBURDEN EOH @ 9.14m.

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Reverse Circulation Drill Hole
Summary Log

DDH # : RC6-2

Property:	BUFFALO HILLS	Start date:	July 27, 1997
Claim name:	3-30-91-10-5	End date:	July 27, 1997
Claim number:	9396060049	Contractor:	MIDNIGHT SUN
Map NTS:	84B/13	Geologist:	D. STRICKLAND
Elevation:		Hole Length:	9.14
Anomaly # :	6	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,308,731.00	Core size:	4"
Easting:	585,227.00	Measure. units:	m
Permit # :	MME-970336		

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Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	9.14	OVERBURDEN EOH @ 9.14m.

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DDH # : RC6-2A

Property: BUFFALO HILLS
Claim name: 3-30-91-10-5
Claim number: 9396060049
Map NTS: 84B/13

Start date: July 27, 1997
End date: July 29, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 6
UTM zone: 11
Northing: 6,308,731.00
Easting: 585,228.00
Permit # : MME-970336

Hole Length: 35.05
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	6.10	OVERBURDEN
6.10	35.05	KIMBERLITE Brownish-green, limonitized and serpentinized kimberlite with complete alteration of olivine and matrix. The kimberlite is olivine (pseudomorph)-rich and displays 2 populations of olivine, macrocrystal and groundmass. Other constituents include 20-30% lapilli and 10-20% crustal xenoliths (limestone and shale). The upper section displays moderate to good sorting and the lower section is moderately to poorly sorted. EOH @ 35.05m.

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Reverse Circulation Drill Hole
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DDH # : RC6-3

Property: BUFFALO HILLS
Claim name: 3-30-91-10-5
Claim number: 9396060049
Map NTS: 84B/13

Start date: July 29, 1997
End date: July 30, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 6
UTM zone: 11
Northing: 6,308,733.00
Easting: 585,302.00
Permit # : MME-970336

Hole Length: 77.72
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	6.10	OVERBURDEN
6.10	77.72	KIMBERLITE Light yellow-green grading to dark green, dark brown and black with depth. 6.10-15.24m Weathered irregularly in brown and light green, olivine 30-40%, altered to brown and black, altered lapilli also present. 15.24-18.29m Green, olivine altered to a brown colour. Some olivine is fresh. 18.29-51.82m Green and brown. Olivine 30-40% subrounded to round. Lapilli also altered. Carbonate is common. 51.82-77.72m Sudden change to black colour. Olivines also altered to black. Groundmass is calcitized, ~2% fresh olivine grains. Shale occurs alone or as cores to lapilli. EOH @ 77.72m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
Summary Log

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DDH # : RC6-4

Property: BUFFALO HILLS
Claim name: 2-30-91-10-5
Claim number: 9396060049
Map NTS: 84B/13

Start date: July 30, 1997
End date: July 31, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 6
UTM zone: 11
Northing: 6,308,731.00
Easting: 585,368.00
Permit # : MME-970336

Hole Length: 89.90
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	6.10	OVERBURDEN
6.10	89.90	KIMBERLITE Kimberlite which displays colour changes through dark green and brown at the top to light green at the bottom. 6.10-9.14m Brown and black chips, olivine altered to limonite and magnetite. Well sorted. 9.14-24.38m Calcitization of groundmass. Olivine mainly altered to magnetite. 24.38-30.48m Intensive alteration, yellow and black, olivine is poorly sorted. 30.48-39.62m Black to dark green with intensive calcitization of groundmass, single grains of fresh olivine occur. 39.62-45.72m Brown, more fresh olivine, groundmass partly serpentinized. 45.72-57.91m Abundance of fresh olivine (20-30%), 30% lapilli, poor sorting, limestone xenoliths. 57.91-60.96m Olivine is subangular, groundmass is completely serpentinized. 60.96-85.34m Partial to complete calcitization of matrix, 30-40% fresh olivine, 20-30% lapilli, two generations of olivine, good sorting. 85.34-89.90m Lapilli increase to 30-40%, some are cored, very poor sorting. EOH @ 89.90m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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UNTIL

DDH # : RC6-5

Property: BUFFALO HILLS
Claim name: 3-30-91-10-5
Claim number: 9396060049
Map NTS: 84B/13

Start date: July 31, 1997
End date: August 1, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 6
UTM zone: 11
Northing: 6,308,736.00
Easting: 585,368.00
Permit # : MME-970336

Hole Length: 96.00
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO TEST ANOMALY 6.

FROM	TO	Description
0.00	96.00	OVERBURDEN EOH @ 96.00m in overburden.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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DDH # : RC14-1

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Property:	BUFFALO HILLS	Start date:	July 10, 1997
Claim name:	13-12-92-11-5	End date:	July 14, 1997
Claim number:	9396060058	Contractor:	MIDNIGHT SUN
Map NTS:	84B/13	Geologist:	D. STRICKLAND
Elevation:		Hole Length:	44.00
Anomaly # :	14	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,315,054.00	Core size:	4"
Easting:	582,868.00	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	4.00	OVERBURDEN
4.00	44.00	KIMBERLITE Kimberlite composed of brown to green, serpentinized olivine macrocrysts and groundmass olivine which account for 40-45% of the rock. The matrix is fine-grained and nearly aphanitic and comprises another 40-45% of the rock. Lapilli up to 3cm are light green to grey. Yellow-white carbonate comprises 5-10%. Mica <1%, <1% shale xenoliths to 3mm. From 8-20m, the colour is grey-green and the rock is highly weathered. From 20-34m, the kimberlte is less altered and a blue-grey green colour. From 34-44m, the colour becomes grey black and the rock is less altered. EOH @ 44.0m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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UNTIL

DDH # : RC14-2

Property: BUFFALO HILLS
Claim name: 13-12-92-11-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: July 14, 1997
End date: July 14, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 14
UTM zone: 11
Northing: 6,315,059.00
Easting: 582,868.00
Permit # : MME-970336

Hole Length: 86.90
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	3.66	OVERBURDEN
3.66	86.90	KIMBERLITE Light grey-green near the top of the hole grading to black green nearer the bottom. The rock is composed of two generations of olivine (40-45%): macrocrysts up to 3mm and groundmass olivine. Another 40-45% is the very fine-grained to aphanitic groundmass. Also present: <1% brown mica, small lapilli, <5% carbonate. 3.66-6.71m Coarse-grained, light grey, olivine is yellow-brown. 6.71-15.85m Becomes like a fine powder and is light grey-green. 15.85-28.04m Light blue-green to grey-black with green olivine, becoming less altered. 28.04-86.90m Olivine becomes black in a dark green matrix. EOH @ 86.90m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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DDH # : RC14-3

Property:	BUFFALO HILLS	Start date:	July 15, 1997
Claim name:	13-12-92-11-5	End date:	July 15, 1997
Claim number:	9396060058	Contractor:	MIDNIGHT SUN
Map NTS:	84B/13	Geologist:	D. STRICKLAND
Elevation:		Hole Length:	88.40
Anomaly # :	14	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,315,054.00	Core size:	4"
Easting:	582,816.00	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	5.18	OVERBURDEN
5.18	88.40	KIMBERLITE Light grey-yellow-green at the top of the hole, grading to black green at the bottom of the hole. The rock contains two generations of olivine (40-45%): macrocrysts up to 3mm and groundmass olivine. The matrix comprises another 40-45% and is very fine grained to aphanitic. Also present is <1% brown mica, lapilli, <5% carbonate, <1% shale. 5.18-11.28m Light grey-yellow-green, olivine is yellow brown. 11.28-14.33m Transition between above and below. 14.33-17.37m Grey-blue-green. Olivine is less-altered and the matrix becomes a slightly darker green. 17.37-20.42m Grey-green. 20.42-23.47m Light grey-green. 23.47-29.57m Grey-green. 29.57-88.40m Olivine is black and the matrix is dark green. EOH @ 88.40m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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UNTIL

DDH # : RC14-4

Property: BUFFALO HILLS
Claim name: 13-12-92-11-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: July 15, 1997
End date: July 16, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 14
UTM zone: 11
Northing: 6,315,075.00
Easting: 582,896.00
Permit # : MME-970336

Hole Length: 99.10
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	3.66	OVERBURDEN
3.66	99.10	KIMBERLITE Light grey-yellow-green at the top of the hole, grading to black green at the bottom of the hole. The rock contains two generations of olivine (40-45%): macrocrysts up to 3mm and groundmass olivine. The matrix comprises another 40-45% and is very fine grained to aphanitic. Also present is <1% brown mica, lapilli, <5% carbonate, <1% shale. 3.66-12.80m Light grey-yellow-green. Olivine is yellow-brown. 12.80-31.09m Grey-blue-green, olivine becomes less altered and the matrix becomes a slightly darker green. 31.09-34.14m Grey-green. 34.14-99.10m Olivine is black and the matrix becomes lighter green. EOH @ 99.10m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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DDH # : RC14-5

Property: BUFFALO HILLS
Claim name: 13-12-92-11-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: July 16, 1997
End date: July 17, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 14
UTM zone: 11
Northing: 6,315,084.00
Easting: 582,918.00
Permit # : MME-970336

Hole Length: 86.90
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	5.18	OVERBURDEN
5.18	86.90	KIMBERLITE Light grey-yellow-green at the top of the hole, grading to black green at the bottom of the hole. The rock contains two generations of olivine (40-45%): macrocrysts up to 3mm and groundmass olivine. The matrix comprises another 40-45% and is very fine grained to aphanitic. Also present is <1% brown mica lapilli, <5% carbonate, <1% shale. 5.18-14.33m Grey-yellow-green, olivine is yellow-brown. 14.33-17.37m Fine-grained. 17.37-26.52m Grey-blue-green, olivine becomes less altered and the matrix becomes a slightly darker green, <1% are yellow. 26.52-32.61m Grey-green. 32.61-35.66m Grey-green with hints of brown, fine-grained. 35.66-44.81m Becoming progressively finer-grained. 44.81-86.90m Coarse-grained with black olivine. EOH @ 86.90m.

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Reverse Circulation Drill Hole
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UNTIL

DDH # : RC14-6

Property: BUFFALO HILLS
Claim name: 13-12-92-11-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: July 17, 1997
End date: July 18, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 14
UTM zone: 11
Northing: 6,315,090.00
Easting: 582,956.00
Permit # : MME-970336

Hole Length: 89.90
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	5.18	OVERBURDEN
5.18	89.90	KIMBERLITE Light grey-yellow-green at the top of the hole, grading to black green at the bottom of the hole. The rock contains two generations of olivine (40-45%): macrocrysts up to 3mm and groundmass olivine. The matrix comprises another 40-45% and is very fine grained to aphanitic. Also present is <1% brown mica, lapilli, <5% carbonate, <1% shale. 5.18-11.28m Grey-yellow-green. Olivine is yellow-brown. 11.28-26.52m Grey-blue-green. Olivine becomes less altered and the matrix becomes a slightly darker green. 26.52-32.61m Grey-green. 32.61-89.90m Coarse-grained, with black olivine and a dark green matrix. EOH @ 89.90m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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DDH # : RC14-7

Property: BUFFALO HILLS
Claim name: 13-12-92-11-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: July 18, 1997
End date: July 19, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 14
UTM zone: 11
Northing: 6,315,088.00
Easting: 582,933.00
Permit # : MME-970336

Hole Length: 94.50
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO SAMPLE K14.

FROM	TO	Description
0.00	5.18	OVERBURDEN
5.18	94.50	KIMBERLITE Light green at top to dark green at the bottom. Two generations of olivine: macrocrystal and groundmass. Olivine mainly altered partially or completely to limonite and/or magnetite. Lapilli are present but difficult to observe. 5.18-8.22m Olivine-rich (40-50%), macrocrystal and groundmass olivine partly limonitized. 8.22-11.28m Sandy-look, probably due to weathering. 11.28-23.47m Weathered groundmass, olivine seems coarser and more limonitized. 23.47-26.52m Less weathered, only macrocrystal olivine (3-5mm) which are completely limonitized. Calcite crystals. 26.52-29.57m Intensively altered groundmass. 29.57-32.61m Fresh kimberlite, olivine altered to magnetite, some lapilli, calcite crystals. 32.61-53.95m Abundant limestone fragments. 53.95-94.50m Dark green, many shale fragments, olivine completely altered to magnetite. EOH @ 94.50m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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DDH # : RCI4-8

Property: BUFFALO HILLS
Claim name: 4-13-92-11-5
Claim number: 9396060058
Map NTS: 84B/13

Start date: July 19, 1997
End date: July 21, 1997
Contractor: MIDNIGHT SUN
Geologist: D. STRICKLAND

Elevation:
Anomaly # : 14C
UTM zone: 11
Northing: 6,315,570.00
Easting: 583,063.00
Permit # : MME-970336

Hole Length: 30.50
Azimuth at Collar:
Incline at Collar: -90.00
Core size: 4"
Measure. units: m

Purpose of Hole: TO TEST ANOMALY 14C.

FROM	TO	Description
0.00	10.67	OVERBURDEN
10.67	30.50	KIMBERLITE Grey grading to dark green. 10.67-13.72m Probably sandstone (from overburden) mixed in with kimberlite. 13.72-30.50m Kimberlite is serpentinized, 30-40% lapilli, olivine is fresh to altered, brown, ~10% altered shale fragments. EOH @ 30.50m.

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Ashton Mining of Canada Inc.
Reverse Circulation Drill Hole
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DDH # : RC14-9

Property:	BUFFALO HILLS	Start date:	July 22, 1997
Claim name:	5-13-92-11-5	End date:	July 24, 1997
Claim number:	9396060058	Contractor:	MIDNIGHT SUN
Map NTS:	84B/13	Geologist:	D. STRICKLAND
Elevation:	602.00	Hole Length:	70.10
Anomaly # :	WP	Azimuth at Collar:	
UTM zone:	11	Incline at Collar:	-90.00
Northing:	6,315,570.00	Core size:	4"
Easting:	583,063.00	Measure. units:	m
Permit # :	MME-970336		

Purpose of Hole: TO TEST THE WP ANOMALY.

FROM	TO	Description
0.00	70.10	OVERBURDEN EOH @ 70.10m.

APPENDIX E

RESULTS OF MICRODIAMOND TESTING
RESULTS OF DMS PROCESSING

Appendix E
Results of Microdiamond Testing

Pipe	Drill Hole	Sample Number	Lab	Interval (m)	Sample Wt (kg)	Number of Stones	
						-0.5 mm	≥0.5 mm
K1-A	1A-1	1A-1-1	AMC	32.4 - 39.8	46.6	1	0
	1A-1	1A-1-2	AML	39.8 - 46.95	44.8	0	0
	1A-1	1A-1-3	AMC	46.95 - 55.00	49.1	1	0
	1A-2	1A-2-2	AML	131.4 - 137.7	43.8	0	0
K1-A			**total**		**184.3**	**2**	**0**
K1-B	1B-1	1B-1-1	AML	32.4 - 40.8	46.7	1	0
	1B-1	1B-1-2	AMC	40.8 - 50.0	43.1	1	0
	1B-2	1B-2-1	AML	31.6 - 39.3	45.0	0	2
	1B-2	1B-2-2	AMC	46.3 - 54.7	47.3	0	0
K1-B			**total**		**182.1**	**2**	**2**
K4A	4A-1	4A-1-1	AMC	23.06 - 43.62	47.6	1	0
	4A-1	4A-1-3	AML	49.35 - 62.62	49.4	1	0
	4A-1	4A-1-6	AMC	90.52 - 105.76	47.9	0	1
	4A-1	4A1-7	AML	105.76 - 119.1	49.8	0	0
K4A			**total**		**194.7**	**2**	**1**
K4B	4B-1	4B-1-2	AML	24.44 - 37.70	50.1	0	0
	4B-1	4B-1-4	AMC	50.40 - 64.70	48.1	0	0
	4B-1	4B-1-8	AML	105.5 - 117.7	50.4	2	0
	4B-1	4B-1-10	AMC	130.4 - 141.2	48.7	2	0
K4B			**total**		**197.3**	**4**	**0**
K4C	4C-1	4C-1-1	AMC	44.0 - 62.0	72.6	0	0
	4C-1	4C-1-3	AML	77.5 - 94.0	77.4	0	0
	4C-2	4C-2-1	AMC	50.90 - 61.19	48.2	1	0
	4C-2	4C-2-2	AML	61.19 - 83.0	50.8	0	0
	4C-2	4C-2-3	AMC	83.0 - 96.62	48.6	0	0
	4C-2	4C-2-4	AML	96.62 - 110.35	50.5	0	0
K4C			**total**		**348.1**	**1**	**0**
K5A	5A-1	5A-1-3	AMC	24.00 - 38.71	44.5	11	0
	5A-1	5A-1-4	AML	38.71 - 53.00	50.8	10	0
	5A-1	5A-1-6	AML	68.20 - 81.51	50.8	4	0
	5A-1	5A-1-7	AMC	81.51 - 93.85	51.3	11	0
	5A-1	5A-1-8	AML	93.85 - 106.16	50.3	11	0
	5A-2	5A-2-1	AML	15.40 - 31.75	56.5	10	0
	5A-2	5A-2-3	AMC	48.47 - 65.49	55.5	11	1
	5A-2	5A-2-5	AML	81.38 - 93.57	51.5	3	0
	5A-2	5A-2-7	AMC	106.0 - 119.6	50.2	12	0
	5A-3	5A-3-1	AMC	22.75 - 39.48	57.0	18	0
	5A-3	5A-3-2	AML	39.48 - 56.60	61.5	9	0
	5A-3	5A-3-5	AMC	87.47 - 100.98	51.5	2	1
	5A-3	5A-3-7	AML	114.96 -131.22	60.0	4	0
	5A-10	5A-10	AMC	124.05 - 139.29	53.5	34	2
K5A			**total**		**744.9**	**150**	**4**

Appendix E
Results of DMS Processing

Kimberlite	Sample Type	Final Results Date	Weight Proc'd (tonnes)	Total Diamonds >=0.8-6.0mm	Total Wt. (cts) >=0.8-6.0mm	Total Diamonds >=0.5-6.0mm	Total Wt. (cts.) >=0.5-6.0mm
K1	core	12-Feb-98	2.705	0	0.0000	0	0.0000
K2	core	25-Mar-98	1.423	0	0.0000	0	0.0000
K4	core	25-Mar-98	0.489	0	0.0000	0	0.0000
K5	core	26-Feb-98	3.553	0	0.0000	0	0.0000
K6	RC& core	27-Jan-98	9.3029	3	0.8050	5	0.8180
K14	core	16-Jan-98	4.1484	33	0.9250	49	0.9815
K14	RC	10-Nov-97	8.167	77	2.9860	151	3.1810
K19	core	26-Feb-98	1.960	0	0.0000	0	0.0000

540000 mE | 550000 mE | 560000 mE | 570000 mE | 580000 mE | 590000 mE | 600000 mE | 610000 mE | 620000 mE | 630000 mE

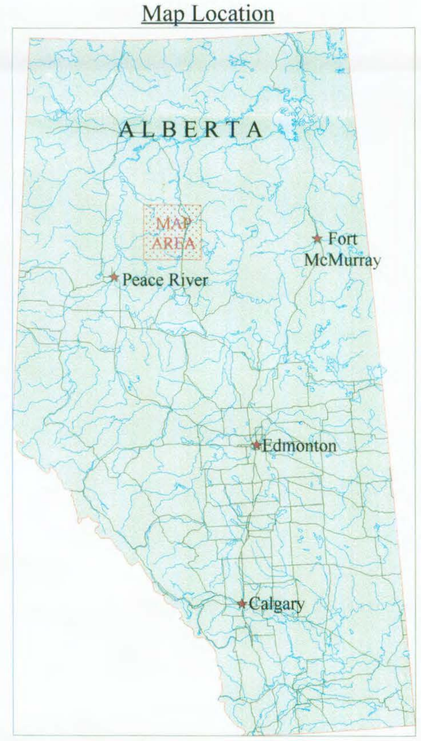
6350000 mN | 6340000 mN | 6330000 mN | 6320000 mN | 6310000 mN | 6300000 mN | 6290000 mN | 6280000 mN | 6270000 mN

	14	13	12	11	10	9	8	7	
95	9396060085	9396060084	9396060083	9396060082	9396060081	9396060080	9396060079	9396060078	95
94	9396060077	9396060076	9396060075	9396060074	9396060073	9396060072	9396060071	9396060070	94
93	9396060069	9396060068	9396060067	9396060066	9396060065	9396060064	9396060063	9396060062	93
92	9396060061	9396060060	9396060059	9396060058	9396060057	9396060056	9396060055	9396060054	92
91	9396060053	9396060052	9396060051	9396060050	9396060049	9396060048	9396060047	9396060046	91
90	9396060045	9396060044	9396060043	9396060042	9396060041	9396060040	9396060039	9396060038	90
89	9396060037	9396060036	9396060035	9396080090	9396080089	9396080088	9396080087	9396080086	89
88	9396060034	9396060033	9396060032	9396060031	9396060030	9396080085	9396080084	9396080083	88

Bison Lake
Russell Lake
Sawn Lake
Haig Lake
Otter Lake
Otter Lake
Loon Lake
Red Earth Creek
Highway #88

N

Map Location



Legend

- MIM Permit
- Property outline
- 91 Township
- 2 Range

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UNTIL

Ashton Mining of Canada Inc.

Date: March 30, 1998
Author: S. Shobridge
Office: Vancouver
Drw: Permit Location Map.Wor
Proj: UTM Zone 11

Buffalo Hills Property, Alberta
Permit Location Map

1998001-5

0 3 6 Kilometers
Scale 1 : 150 000

R12 R11 R10

570000 mE 575000 mE 580000 mE 585000 mE 590000 mE

N

T92 T91 T90 T89

Sawn Lake

6315000 mN 6310000 mN 6305000 mN 6300000 mN 6295000 mN 6290000 mN 6285000 mN

Drill Site 14(1)
DDH-14-1
DDH-14-2
DDH-14-3
DDH-14-4
DDH-14-5

RC 14-9
RC 14-8
RC 14-7
RC 14-6
RC 14-5
RC 14-4
RC 14-3
RC 14-2
RC 14-1

Drill Site 7C
DDH-7C-1

Drill Site 7B
DDH-7B-1

Drill Site 7A
DDH-7A-1

Drill Site 6(1)
DDH-6-1
DDH-6-3
DDH-6-4
DDH-6-5
DDH-6-6

RC 6-1
RC 6-2
RC 6-2A
RC 6-3
RC 6-4
RC 6-5

Drill Site 6(2)
DDH-6-2
DDH-6-7
DDH-6-8
DDH-6-9
DDH-6-10
DDH-6-11

Drill Site 5A(2)
DDH-5A-4
DDH-5A-7
DDH-5A-8
DDH-5A-10

Drill Site 5A(3)
DDH-5A-5
DDH-5A-6

Drill Site 5A(4)
DDH-5A-9

Drill Site 5B
DDH-5B-1
DDH-5B-2

Drill Site 5A(1)
DDH-5A-1
DDH-5A-2
DDH-5A-3

CAMP

Drill Site 4A
DDH-4A-1
DDH-4A-2
DDH-4A-3

Drill Site 4C
DDH-4C-1
DDH-4C-2

Drill Site 4B
DDH-4B-1
DDH-4B-2

Drill Site 19
DDH-19-1
DDH-19-2
DDH-19-3

To Red Earth
Hwy 88

Drill Site 2
DDH-2-1

Drill Site 1B
DDH-1B-1
DDH-1B-2
DDH-1B-3

Drill Site 1A
DDH-1A-1
DDH-1A-2
DDH-1A-3

* Townships and Ranges are West of the 5th Meridian

Legend

- Pipe Lines
- Existing Cut Lines
- All Weather Roads
- ■ Drill Hole Site
- ★ Reverse Circulation Hole
- A 1997 Winter Drilling
- A 1997 Summer Drilling

Ashton Mining of Canada Inc.

Date: June 29, 1998
Author: L Shobridge
Office: Vancouver
Drw: Drill Site & Drill Hole Loc Winter & Summer..Wor
Proj: UTM Zone 11

Buffalo Hills Property, Alberta
DDH & RC Drill Program
Winter and Summer 1997

CONFIDENTIAL
-09- - - 1999
UNTIL

1997 0015

0 0.5 1 Kilometers
Scale 1 : 50 000

AEC

19980015

ALBERTA ENERGY COMPANY LTD.

HIGH RESOLUTION AEROMAGNETIC SURVEY
PEACE RIVER AREA

TOTAL MAGNETIC INTENSITY REDUCED TO THE POLE

PROJECT MANAGEMENT BY
SPECTRA EXPLORATION GEOSCIENCE CORP.

LOCATION MAP

TOTAL MAGNETIC INTENSITY REDUCED TO THE POLE (nT)

2
10
50
250
DEPRESSION
FLIGHT LINES — L1124 + 10460

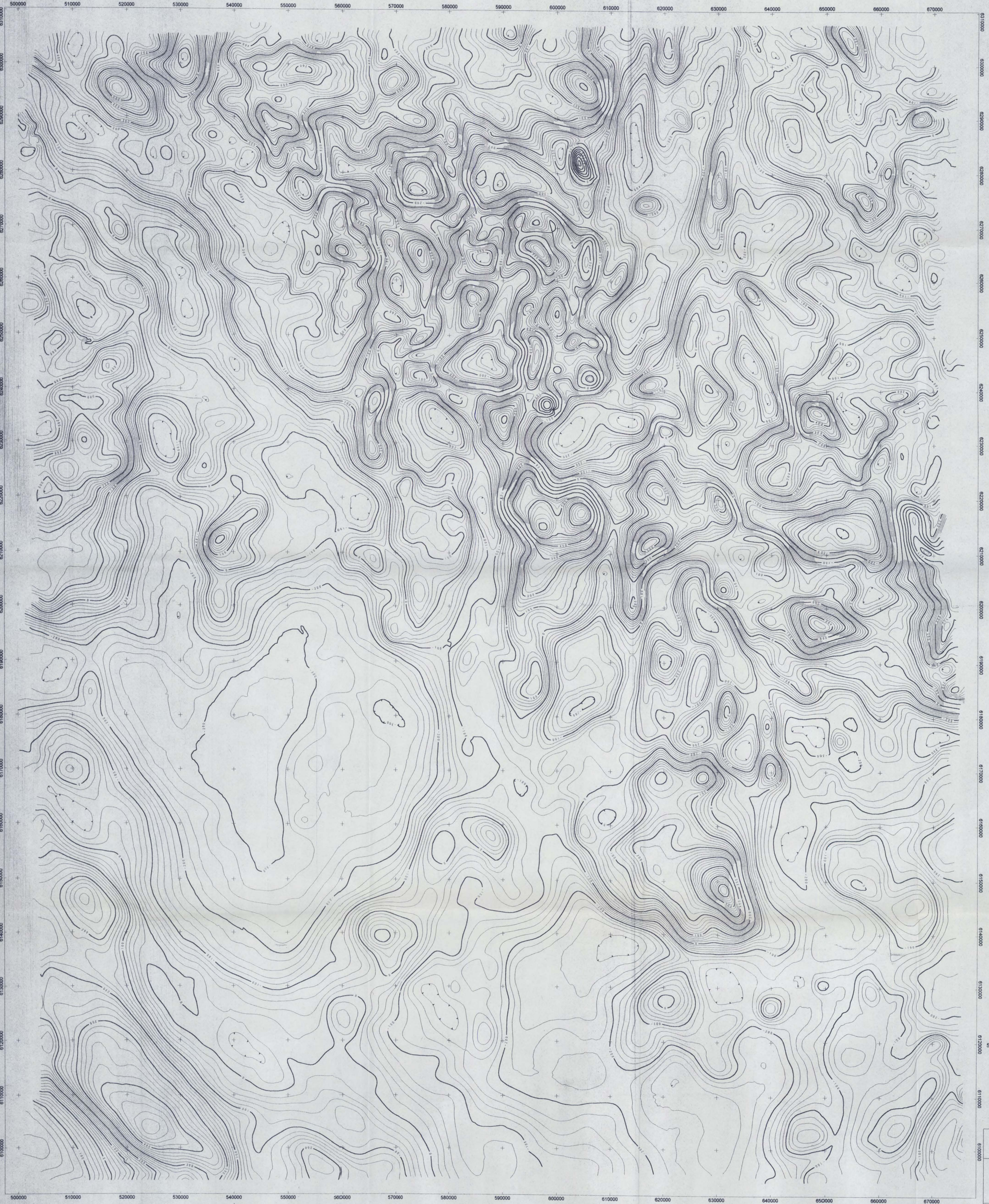
N

Scale 1: 100000

Primary line spacing	600 m
Primary line direction	East - West
Control line spacing	1824 m
Control line direction	North - South
Aircraft altitude	120 m mean terrain clearance
Magnetometer sensor	Scintrex CS-2, cesium vapour
Magnetometer sensitivity	0.01 nT
Aircraft positioning	Differential GPS
GPS receiver	10 channel, Novatel 951R
Aircraft	Beechcraft 65-880 Queenair C-FWZG
Dates flown	January 28 - March 26 1995
IGRF correction	As of date flown
Grid cell size	200 m
Magnetic inclination at 57°N, 115°30'W, on February 15, 1995	78.158°
Magnetic declination at 57°N, 115°30'W, on February 15, 1995	22.533°
Datum	NAD-27
UTM zone	11N

SGL

Flown and compiled by:
Sander Geophysics Limited



Scale 1:250000

5000 0.0 5000 10000 15000

(meters)

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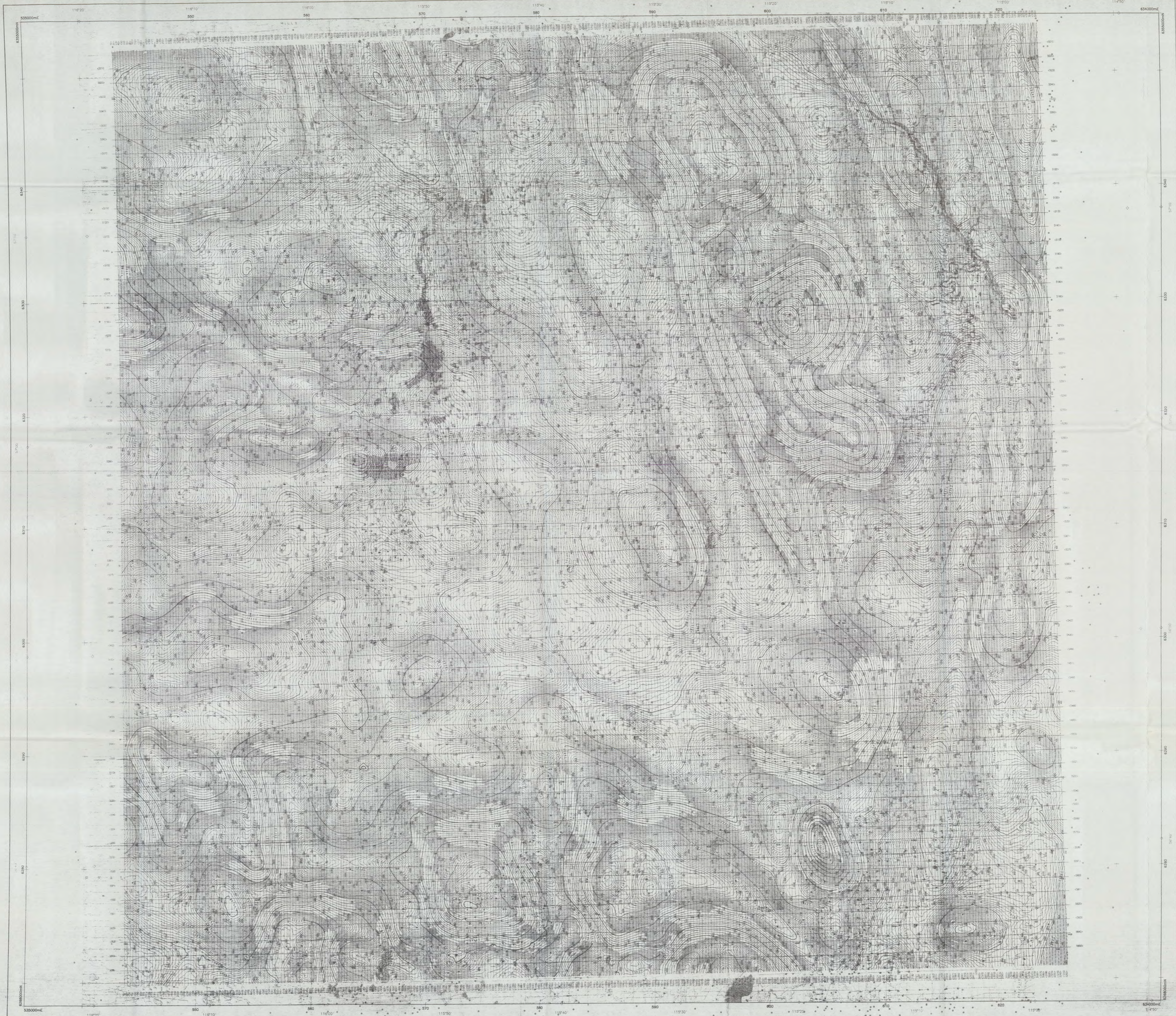
Alberta Energy Company

Utikima Lake j9

Total Magnetic Intensity

19980085

Spectra



Scale 1:100000

2000 0 2000 4000 6000 8000
(metres)

5000 0 5000 10000 15000 20000 25000 30000
(feet)

OPERATIONAL INFORMATION

AIRCRAFT: CESSNA U206
CONFIGURATION: TAIL STINGER AND WING TIP PODS
SENSOR: SCINTREX CESIUM VAPOUR
FLIGHT PLAN: 250 METRE LINE SPACING
NOMINAL TERRAIN CLEARANCE: 80 METRES

NAVIGATION: GLOBAL POSITIONING SYSTEM (G.P.S)

1 mm Circles Represent Digital Well Locations

80 metres Grid Cell Size
Contour Intervals (nT)

5
20
100
500

IGRF AT 85°40'W 57°N ON SEPTEMBER 1, 1997
TOTAL MAGNETIC FIELD: 60359.42 nT
MAGNETIC INCLINATION: 80.76°
MAGNETIC DECLINATION: 347.02° E

CONFIDENTIAL
-09- - - 1999
UNTIL

19980015

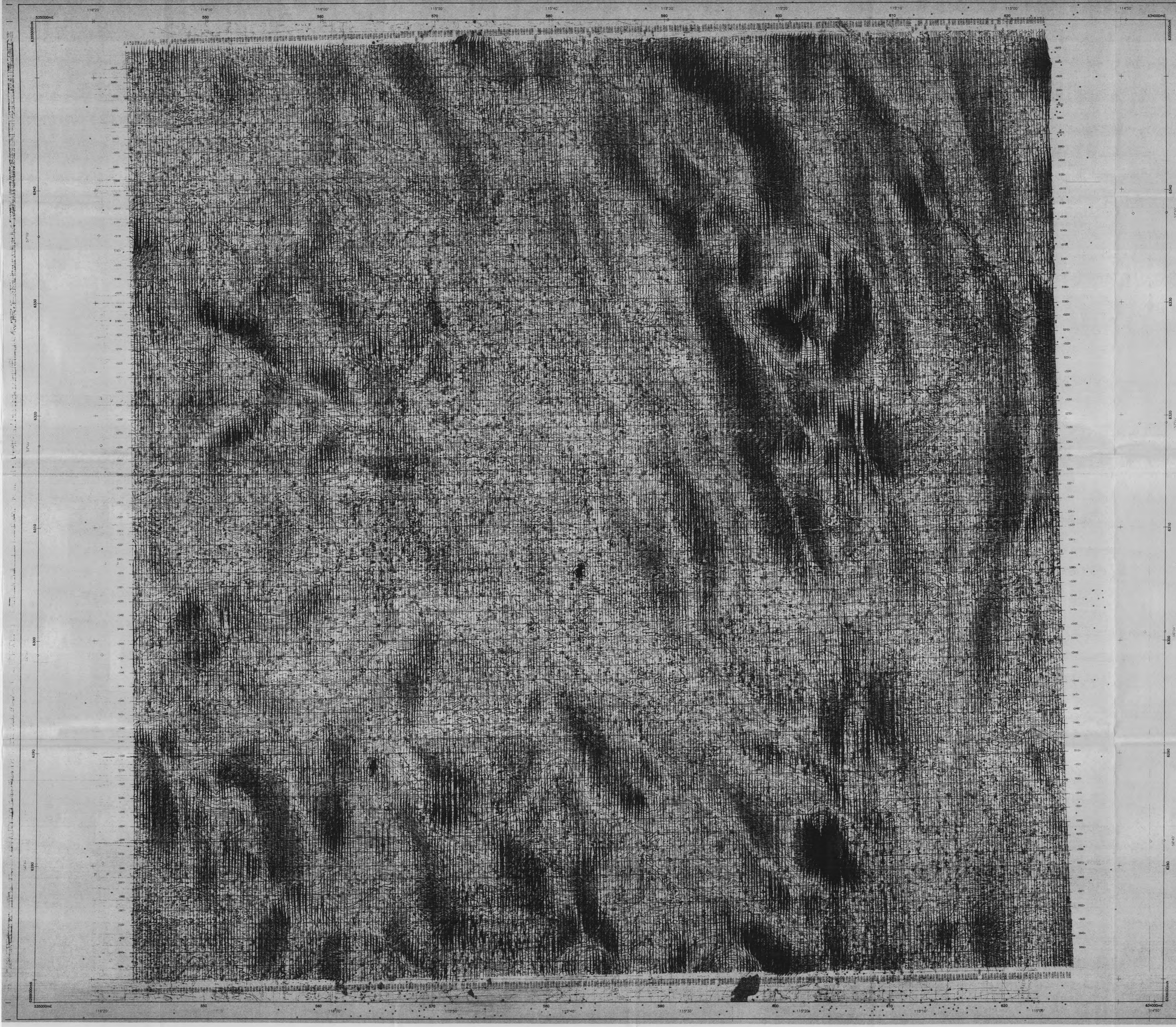
ASHTON MINING OF CANADA INC.

Reduced to Pole Magnetic Intensity Contours
RED EARTH PROJECT
ALBERTA

Surveyed by
TERRAQUEST LTD.
Mississauga, Ontario, CANADA

Data Compiled and Plotted by
CGI *CONTROLLED* GEOPHYSICS Inc.
Thornhill, Ontario, CANADA

Date: January, 1998 | Figure: A - 976 - 1



Scale 1:100000

2000 0 2000 4000 6000 8000
(metres)

5000 0 5000 10000 15000 20000 25000 30000
(feet)

OPERATIONAL INFORMATION

AIRCRAFT: CESSNA U206
CONFIGURATION: TAIL STINGER AND WING TIP PODS
SENSOR: SCINTREX CESIUM VAPOUR
FLIGHT PLAN: 250 METRE LINE SPACING
NOMINAL TERRAIN CLEARANCE: 80 METRES

NAVIGATION: GLOBAL POSITIONING SYSTEM (G P S)

1 mm Circles Represent Digital Well Locations

Horizontal Gradient Vectors
0.33 nT/m per cm, Max. length 1 cm

60 metres Grid Cell Size
Contour Intervals (nT/m)

0.005
0.025
0.100
0.500

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-09- - - 1999
UNTIL

19980015

ASHTON MINING OF CANADA INC.

Contoured Vertical Gradient of RTF and Horizontal Gradient Vectors

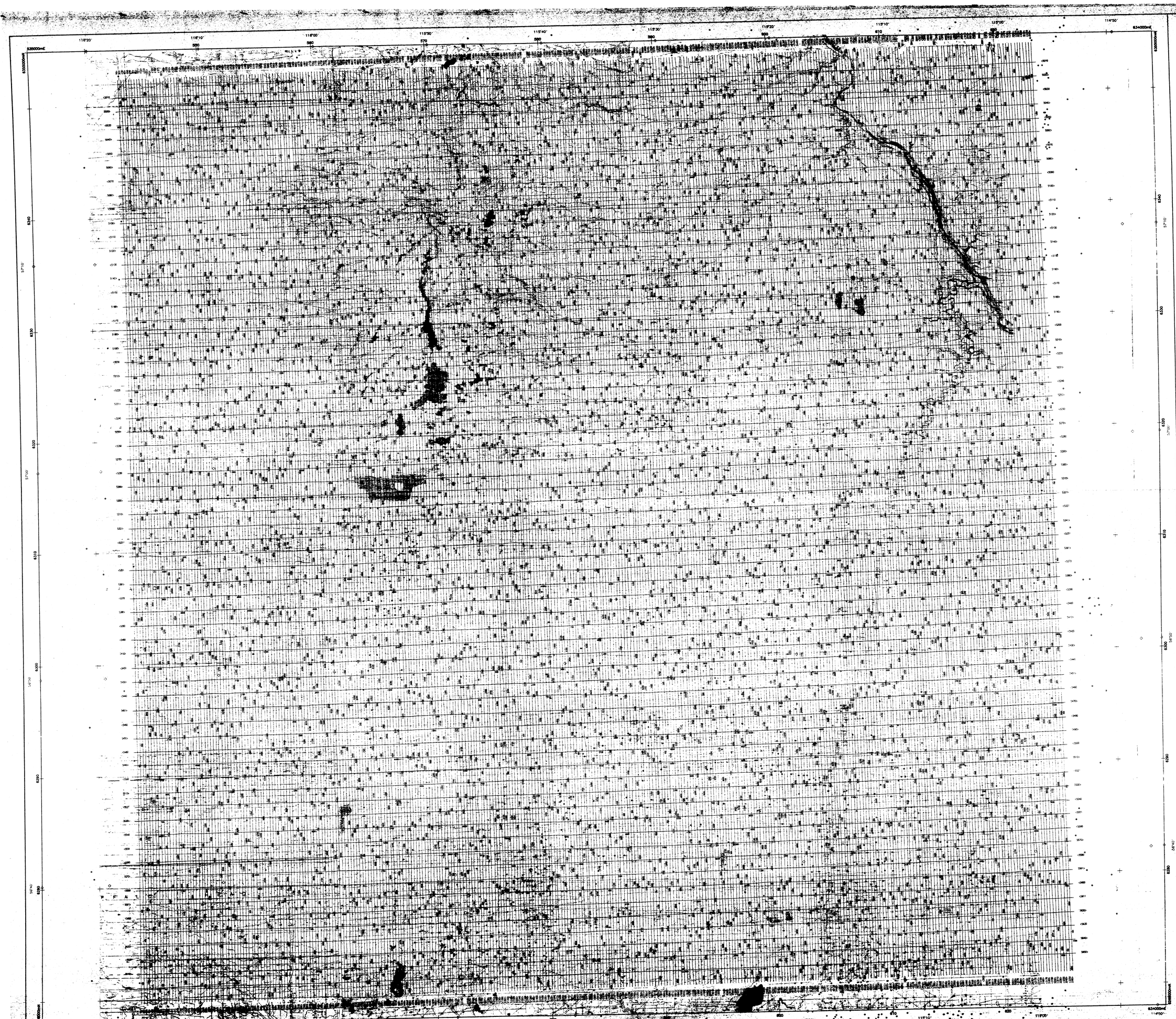
RED EARTH PROJECT

ALBERTA

Surveyed by
TERRAQUEST LTD.
Mississauga, Ontario, CANADA

Data Compiled and Plotted by
CGI *CONTROLLED* GEOPHYSICS Inc.
Thornhill, Ontario, CANADA

Date: January, 1998	Figure: A – 976 – 2



Scale 1:100000

2000 0 2000 4000 6000 8000
(metres)

5000 0 5000 10000 15000 20000 25000 30000
(feet)

OPERATIONAL INFORMATION

AIRCRAFT: CESSNA U206
CONFIGURATION: TAIL STINGER AND WING TIP PODS
SENSOR: SCINTREX CESIUM VAPOUR
FLIGHT PLAN: 250 METRE LINE SPACING
NOMINAL TERRAIN CLEARANCE: 80 METRES

NAVIGATION: GLOBAL POSITIONING SYSTEM (G P S)

1 mm Circles Represent Digital Well Locations

CONFIDENTIAL
-09- - - 1999
UNTIL

1998015

ASHTON MINING OF CANADA INC.

Flight Path Recovery, Topography and Digital Well Locations
RED EARTH PROJECT
ALBERTA

Surveyed by
TERRAQUEST LTD.
Mississauga, Ontario, CANADA

Data Compiled and Plotted by
CGI *CONTROLLED* GEOPHYSICS Inc.
Thornhill, Ontario, CANADA

Date: January, 1998 | Figure: A - 976 - 3

19980015

EXPLORATION APPROVAL APPLICATION

1997 WINTER DRILLING PROGRAM

MME 961552

Prepared for:
Environmental Protection Branch
Alberta

Compiled by:
Reid Mackie & Dave Skelton
Ashton Mining of Canada Inc.
604-983-7750

ASHTON MINING
OF CANADA INC.

VIA COURIER

December 11, 1996

Alberta Environmental Protection
Land Services Branch
3rd Floor, South Petroleum Plaza
9915 - 108 Street
Edmonton, Alberta
T5K 2G8
Attention: Mr. Ralph Jamieson

Dear Mr. Jamieson:

Re: *Application for Exploration Approval for Ashton Drilling Program*

Please find enclosed an application for Exploration Approval submitted on behalf of Ashton Mining of Canada Inc. to undertake an exploratory drilling program on its "Buffalo Hill" property between the dates of January 3, 1997 and March 31, 1997. Also eclosed are a set of 1:50,000 and 1:25,000 scale plans of each site relevant to the proposed operations.

Geophysical Survey
In order to delineate drill targets and minimise the number of drill holes needed to test the targets, ground magnetometer surveys will be undertaken over each anomaly (please see attached plans). Grid lines are normally flagged, however, when necessary they will be cut by hand to a width not exceeding 1.5 metres.

Drilling
The drilling program will consist of 16 "NQ" sized diamond drill holes expected to reach a depth of approximately 200 metres. Drilling equipment to be used will be a track mounted BBS 37A mobile drill. The drill rig will be equipped with a blow out protector from Production Safety that has been modified to fit coring rigs (Mini-Regan typeBOP). When necessary, a small excavator will be used to create sumps for discharged fluids and cuttings. Please see attached Material Safety Data Sheet for a description of the "X-TRA Gel" drilling mud to be used. All water to be used in the program will be delivered from Red Earth.

.../2

UNIT 123-930 WEST 1ST STREET NORTH VANCOUVER B.C. CANADA V7P 3N4 TEL: 604/983-7750 FAX: 604/987-7107

Transportation & Access

Transportation of equipment, personnel and supplies will be along pre-existing access roads and seismic lines. A small bulldozer will be employed to create nine, short distance accesses to the proposed drill sites. The width of the accesses will not exceed 8 meters and their total combined length is not anticipated to exceed 2,500m (please see attached plans for location and details). A four wheel drive truck will be used for the program's day to day transportation needs.

Campsite

Ashton intends to establish a 10 person camp at a previously cleared campsite located at R 10/TP 91, Sec 13, LSD 14, West of the 5th meridian. An 800 watt diesel generator will be in operation at the camp. In addition, up to 100 drums of diesel fuel will be stored at this site to support drilling operations.

If you have any questions or require any additional information, please do not hesitate to contact me at (604) 983-7750.

Best Regards.

ASHTON MINING OF CANADA INC.

[redacted]

Reid Mackie
Joint Venture Relations / Land Administrator
/ram
Enclosures

cc w/ encls: Sheila Barron, AEUB
Richard Goy, Alberta Environmental Protection

\\ashton-vancouver\sys\account\correspo\reid\1996\jamieson 2.doc

WESTCOAST DRILLING SUPPLIES LTD.

#6 - 2351 SIMPSON ROAD
RICHMOND. B.C. V6X 2R2

TEL: (604) 278-4954
FAX: (604) 278-4914

Serving the Drilling Industry

EMERGENCY PHONE NO. (604) 278-4954

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

PRODUCT NAME: **X-TRA GEL**

CHEMICAL FAMILY: Sodium Montmorillonite

WHMIS CLASSIFICATION: Class D-2(A)

WORK PLACE HAZARD: Potential Carcinogen; contains free silica

TRANSPORTATION OF DANGEROUS GOODS (TDGR)

CLASSIFICATION: Not Dangerous Goods

PACKAGE GROUP: Not Applicable

PRODUCT IDENTIFICATION NUMBER (PIN): Not Applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	PERCENTAGE	CAS NUMBER	OSAH PEL	ACGIH TLV
Bentonite		1302-78-9	5 mg/M	Not Applicable
Quartz (Silica)		14808-60-7	10 mg/M	0.1 mg/M
Cyrstobalite		14464-46-1	10 mg/M	0.05 mg/M
Tridymite		15468-32-3	10 mg/M	0.05 mg/M

SECTION III: TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY:
[ ] skin, [ ] eye contact, [xxx]inhalation, [ ] ingestion

ACUTE - SHORT TERM EXPOSURE: Cough if exposed to dust at levels higher than TLV's.

CHRONIC - LONG TERM EXPOSURE: May lead to development of silicosis or other respiratory problems if consistently exposed to free silica containing airborne bentonite.

SECTION IV: FIRST AID MEASURES

No first aid measures are suggested for Chronic (long term exposure). For acute (short term exposure) remove patient from dusty environment.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	Pale grey to buff powder or granules; odourless
DENSITY (SPECIFIC GRAVITY):	2.35
BOILING POINT:	Not Applicable
MELTING POINT:	788°C
WATER SOLUBILITY:	Insoluble; forms colloidal suspension
% VOLATILE BY VOLUME:	Not Applicable
EVAPORATION RATE:	Not Applicable
VAPOUR PRESSURE: (MM Hg)	Not Applicable
VAPOUR DENSITY: (Air = 1)	Not Applicable
Ph:	7 - 6

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Not Applicable FLAMMABLE LIMIT: Not Applicable

EXTINGUISHING MEDIA: Not Applicable

SPECIAL FIRE FIGHTING PROCEDURES: Not Applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not Applicable

SECTION VII: REACTIVITY DATA

STABLE [XXX] INSTABLE: [ ]

INCOMPATIBILITY (CONDITIONS TO AVOID): None

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: Will not occur [xxx] May occur [ ]

SECTION VIII: PREVENTATIVE MEASURES

RESPIRATORY PROTECTION: NIOSH/MSHA approved respirators for silica bearing dust.

VENTILATION: Yes if particular; Personal air supply may be useful.

PROTECTIVE GLOVES: None required.

EYE PROTECTION: Suggest goggles.

OTHER PROTECTIVE EQUIPMENT: None required.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Avoid breathing dust; wear an approved respirator. Practice reasonable caution and personal cleanliness. Avoid eye contact.

STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK

Vacuum or sweep up if dry. Avoid flushing with water as material may become extremely slippery.

WASTE DISPOSAL METHOD

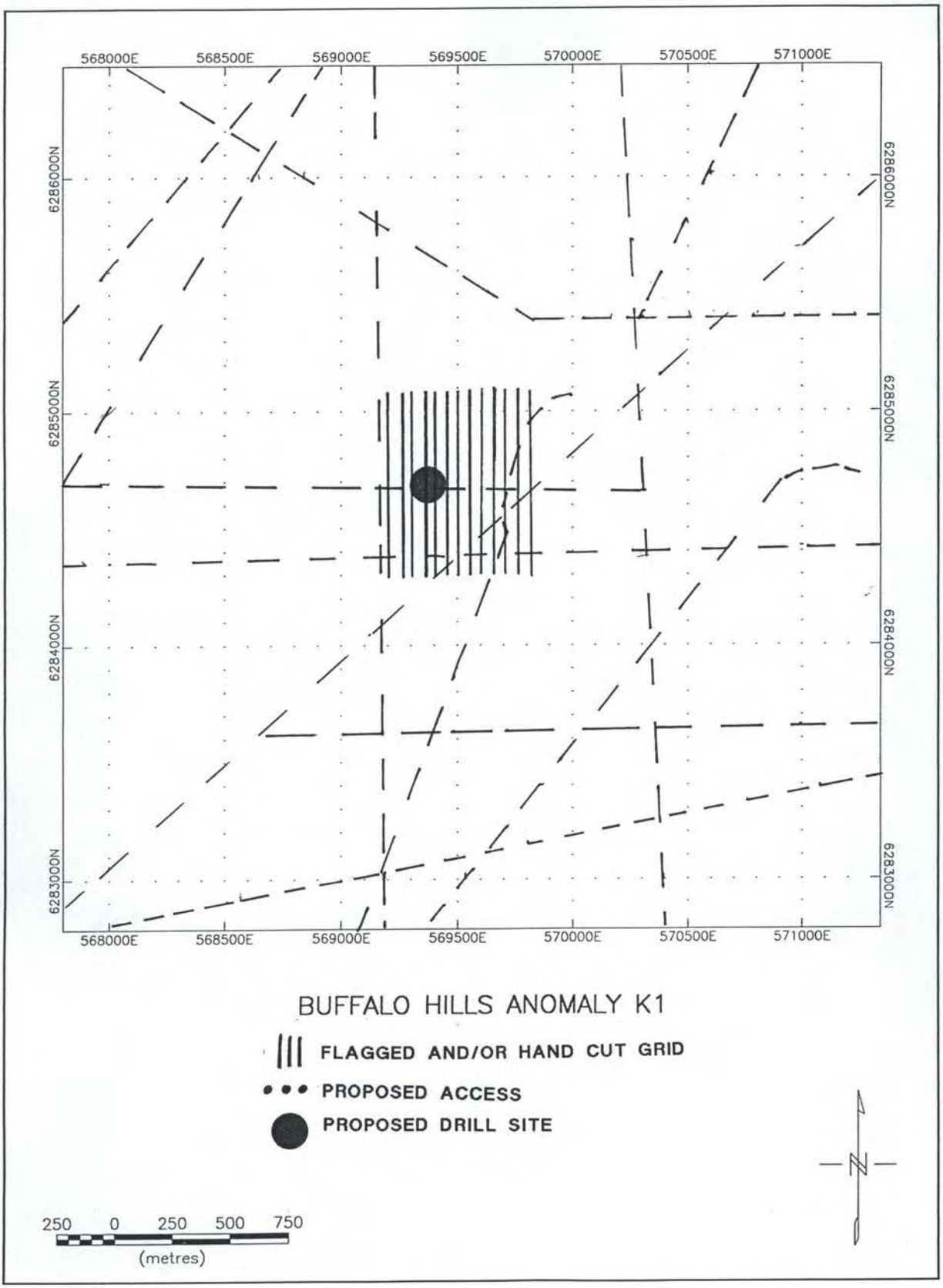
Dispose of material in a manner to prevent generating dust.

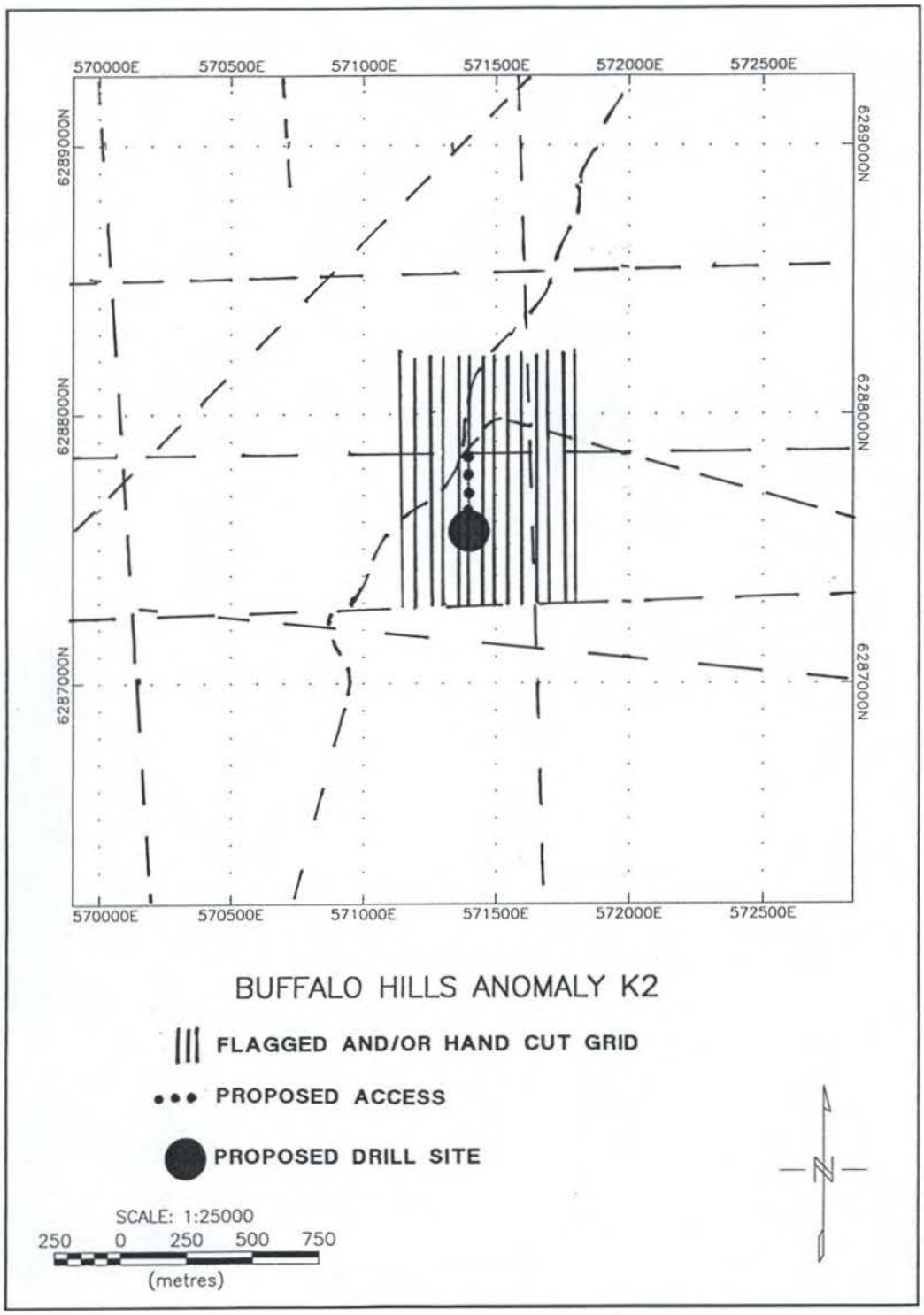
SECTION IX: PREPARATION

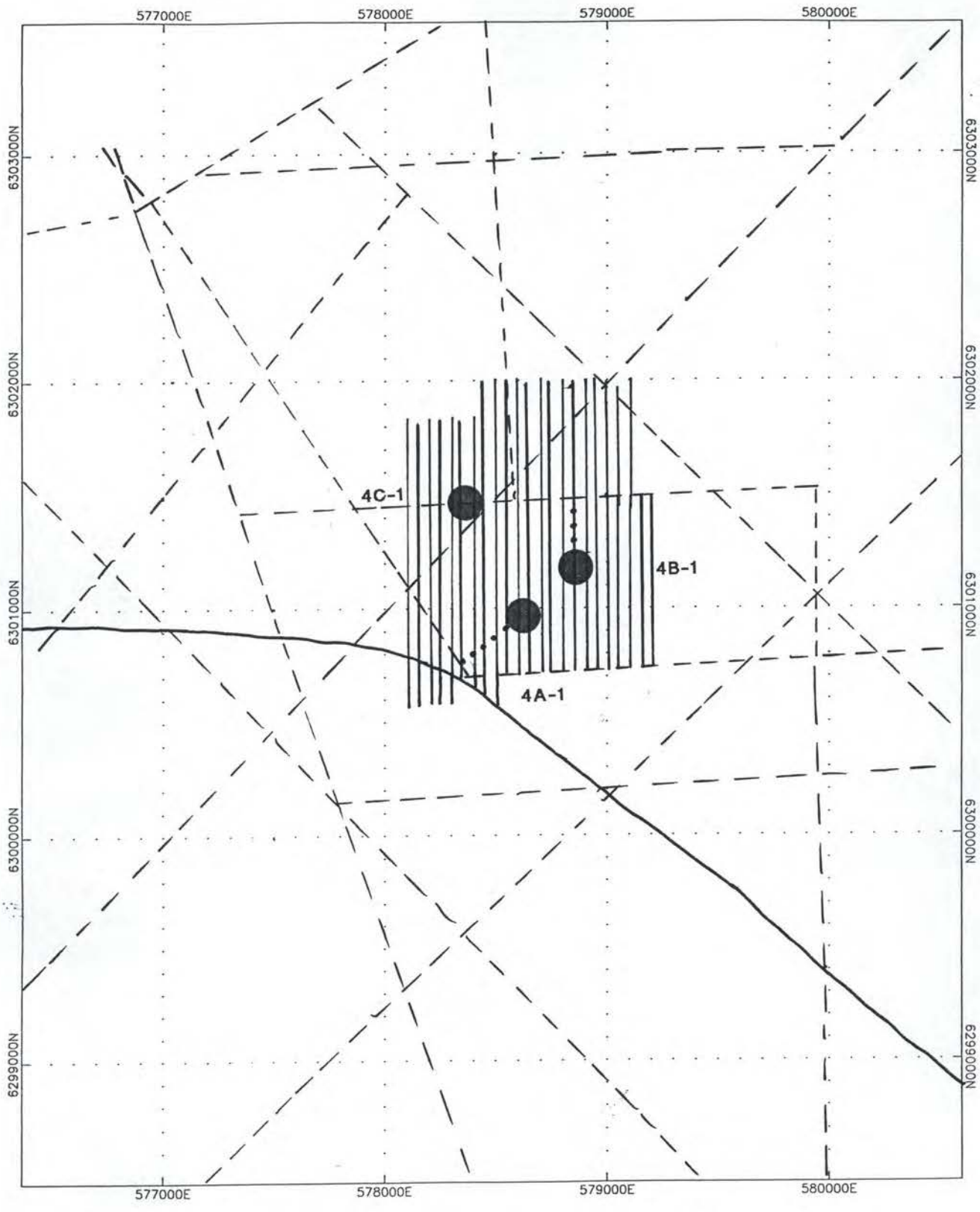
The information contained herein is given in good faith, but no warranty, expressed or implied is made.

Date issued: November 10, 1988
Date Revised: March 1, 1992

By: Product Safety Committee


568000E
568500E
569000E
569500E
570000E
570500E
571000E
6286000N
6285000N
6284000N
6283000N
BUFFALO HILLS ANOMALY K1
FLAGGED AND/OR HAND CUT GRID
PROPOSED ACCESS
PROPOSED DRILL SITE
N
250 0 250 500 750
(metres)


570000E
570500E
571000E
571500E
572000E
572500E
6289000N
6288000N
6287000N
BUFFALO HILLS ANOMALY K2
FLAGGED AND/OR HAND CUT GRID
PROPOSED ACCESS
PROPOSED DRILL SITE
SCALE: 1:25000
250 0 250 500 750
(metres)



BUFFALO HILLS ANOMALY K4 A,B,C,D

SCALE: 1:25000

500 0 500

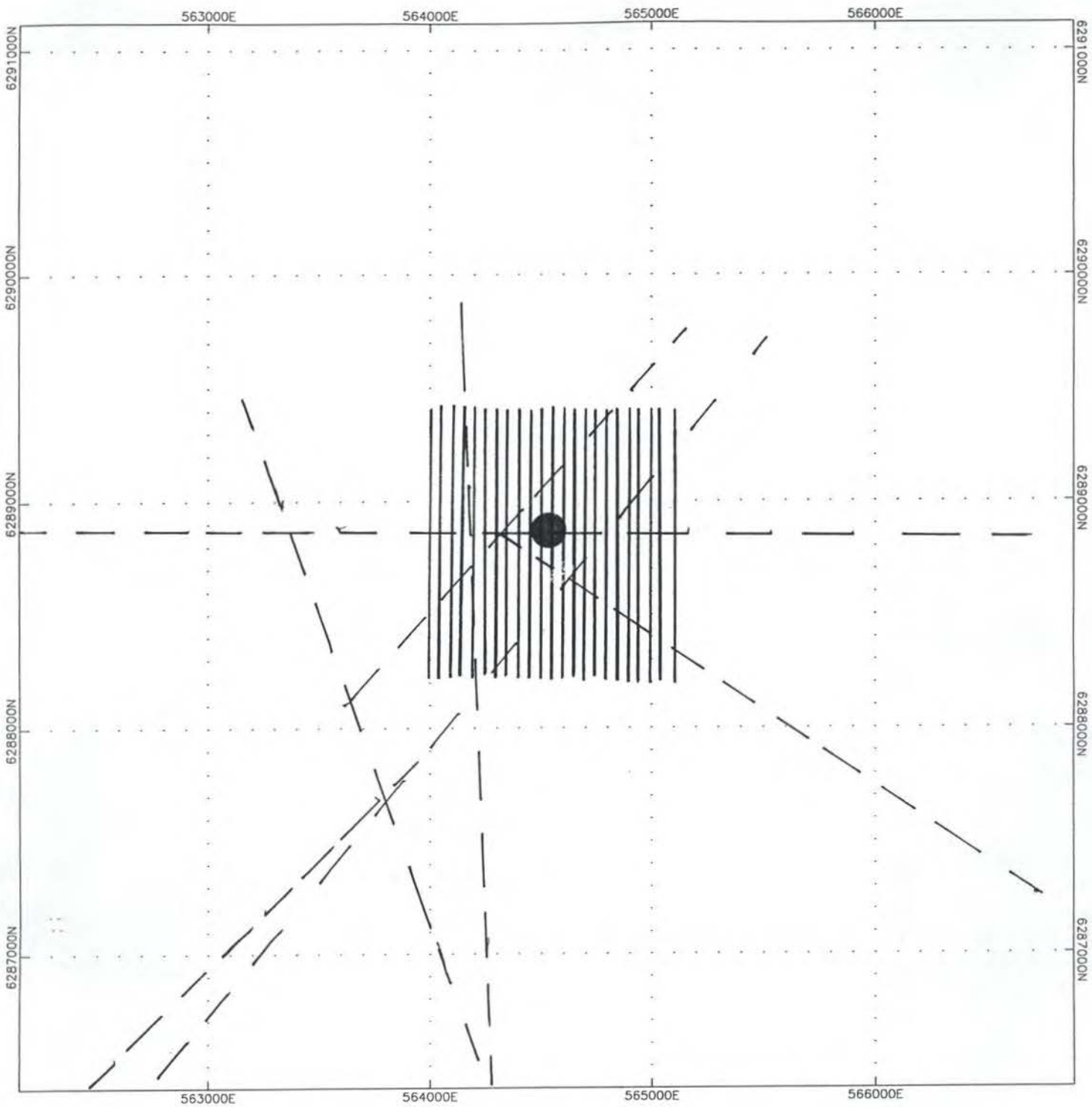
(metres)

FLAGGED AND/OR HANDCUT GRID

PROPOSED ACCESS

PROPOSED DRILL SITE

N



BUFFALO HILLS ANOMALY K3

FLAGGED AND/OR HAND CUT GRID

PROPOSED ACCESS

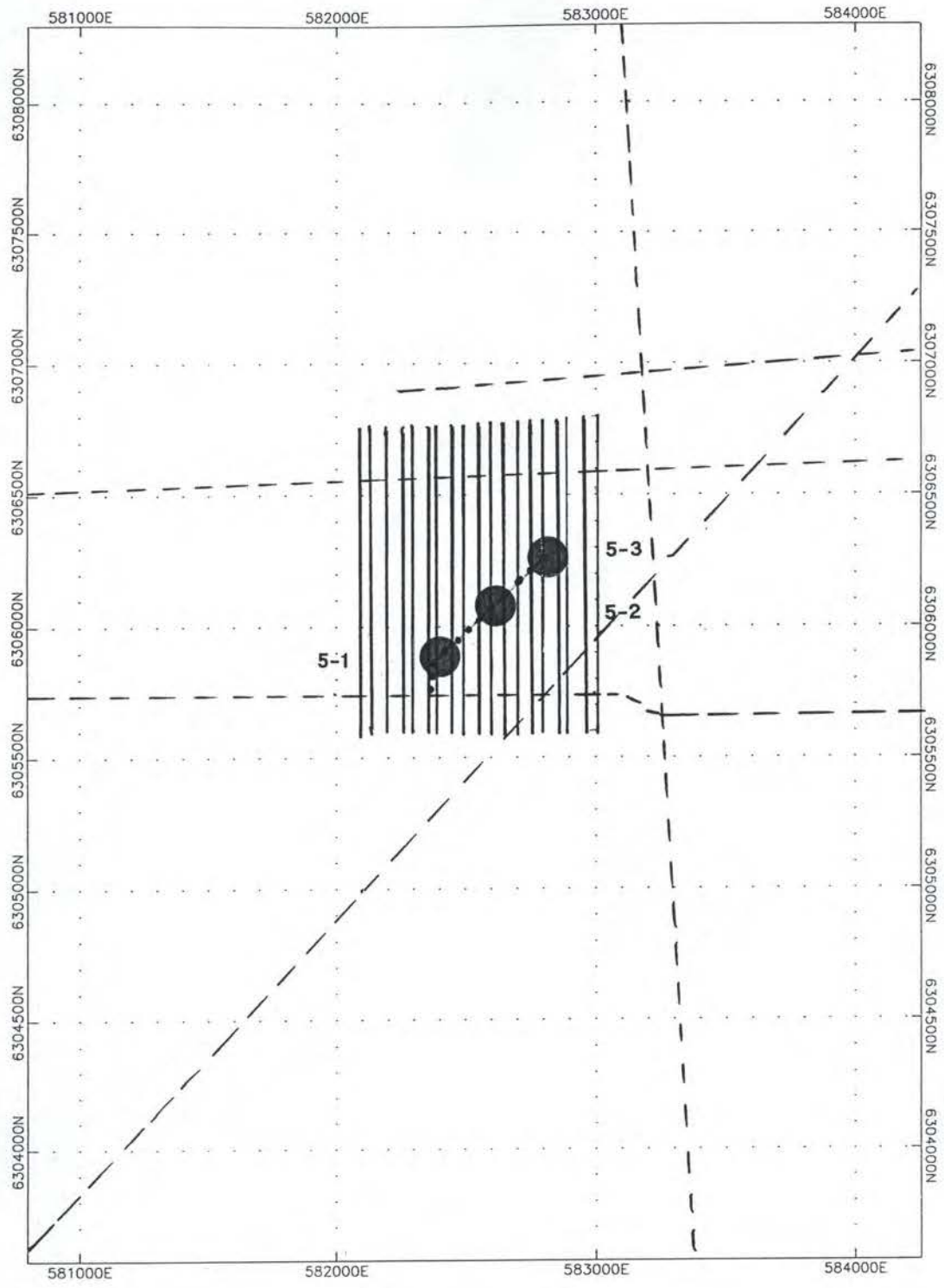
PROPOSED DRILL SITE

SCALE: 1:25000

250 0 250 500 750

(metres)

N



BUFFALO HILLS ANOMALY K5

FLAGGED AND/OR HANDCUT GRID

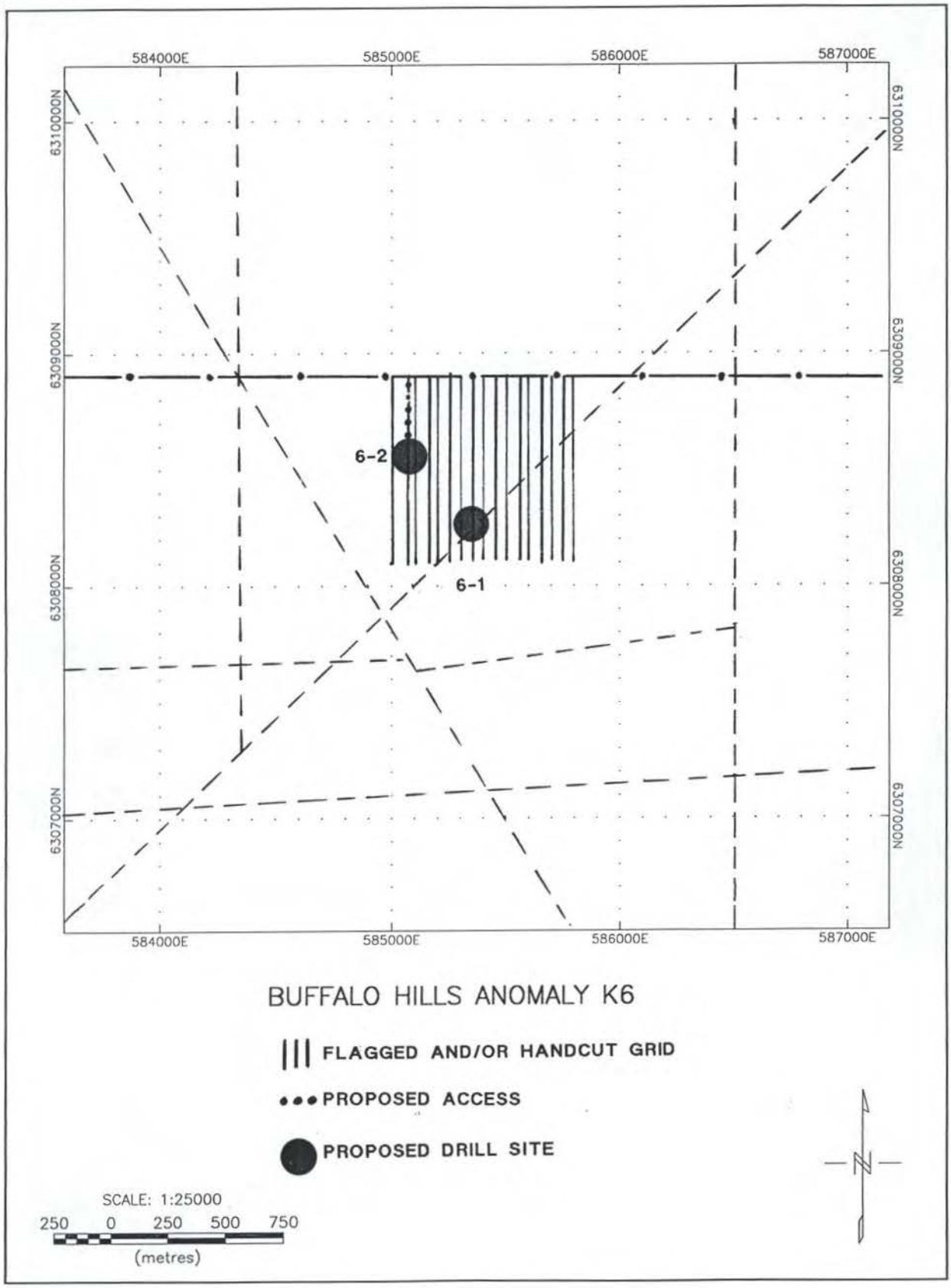
PROPOSED ACCESS

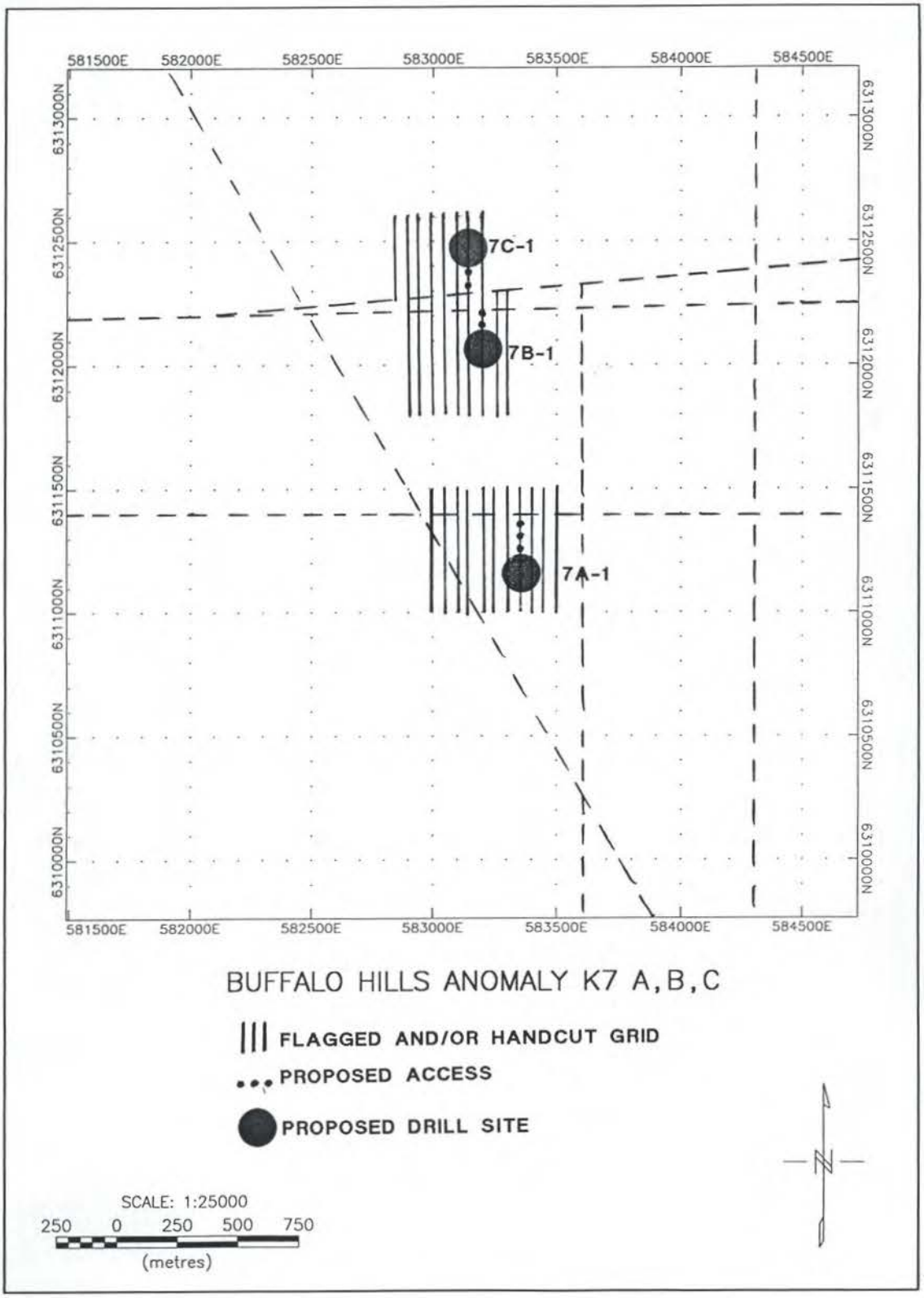
PROPOSED DRILL SITE

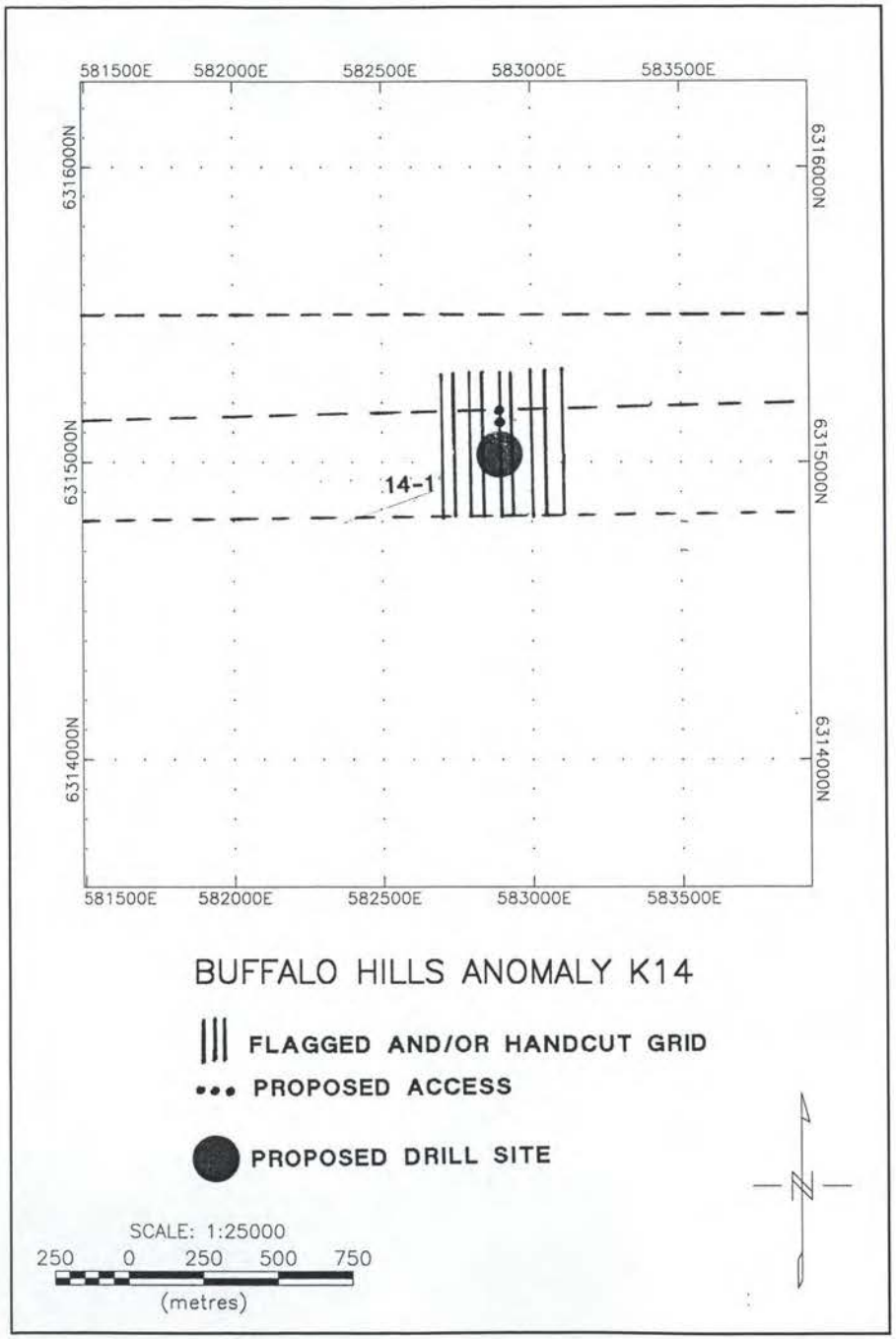
SCALE: 1:25000

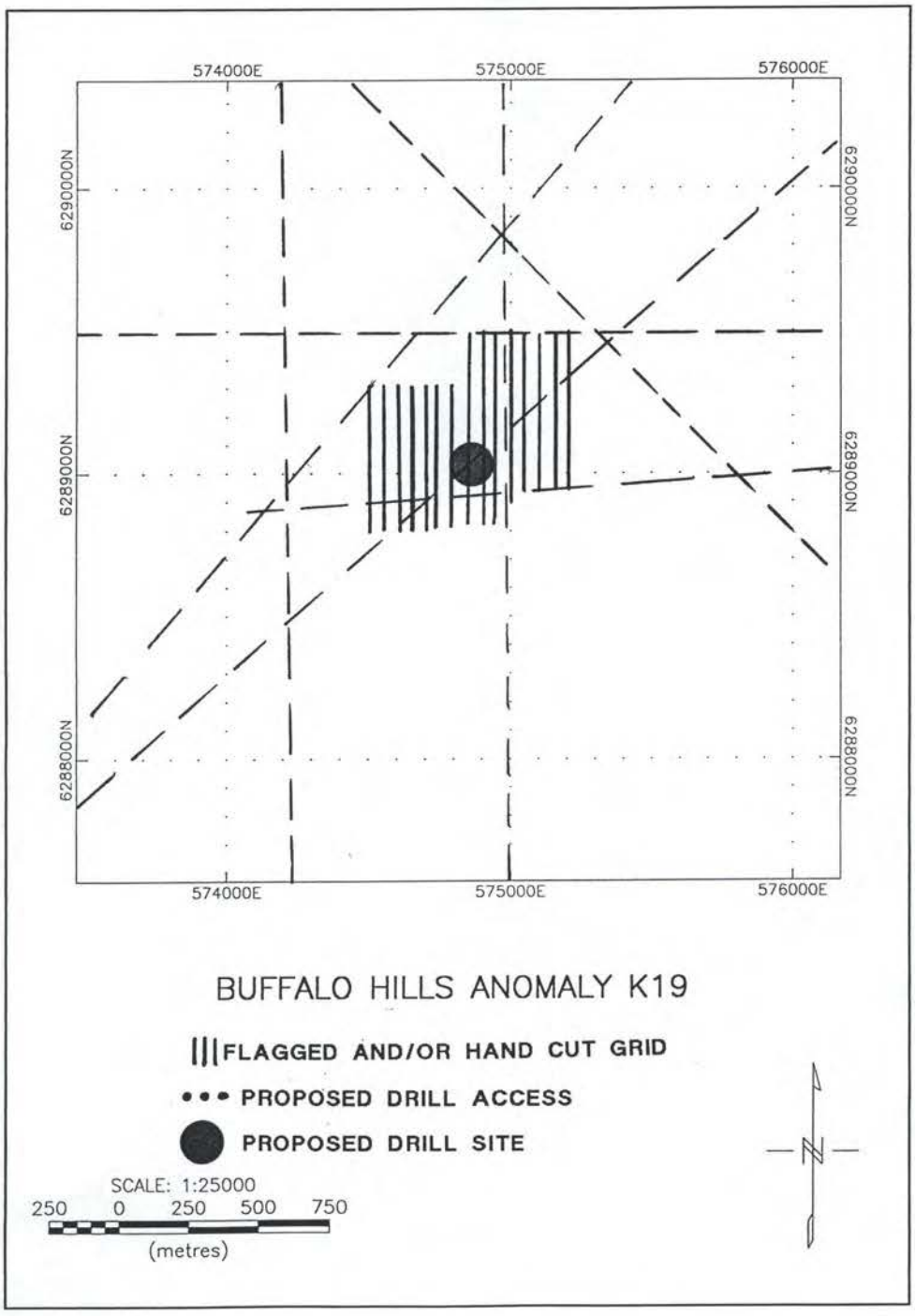
250 0 250 500 750

(metres)

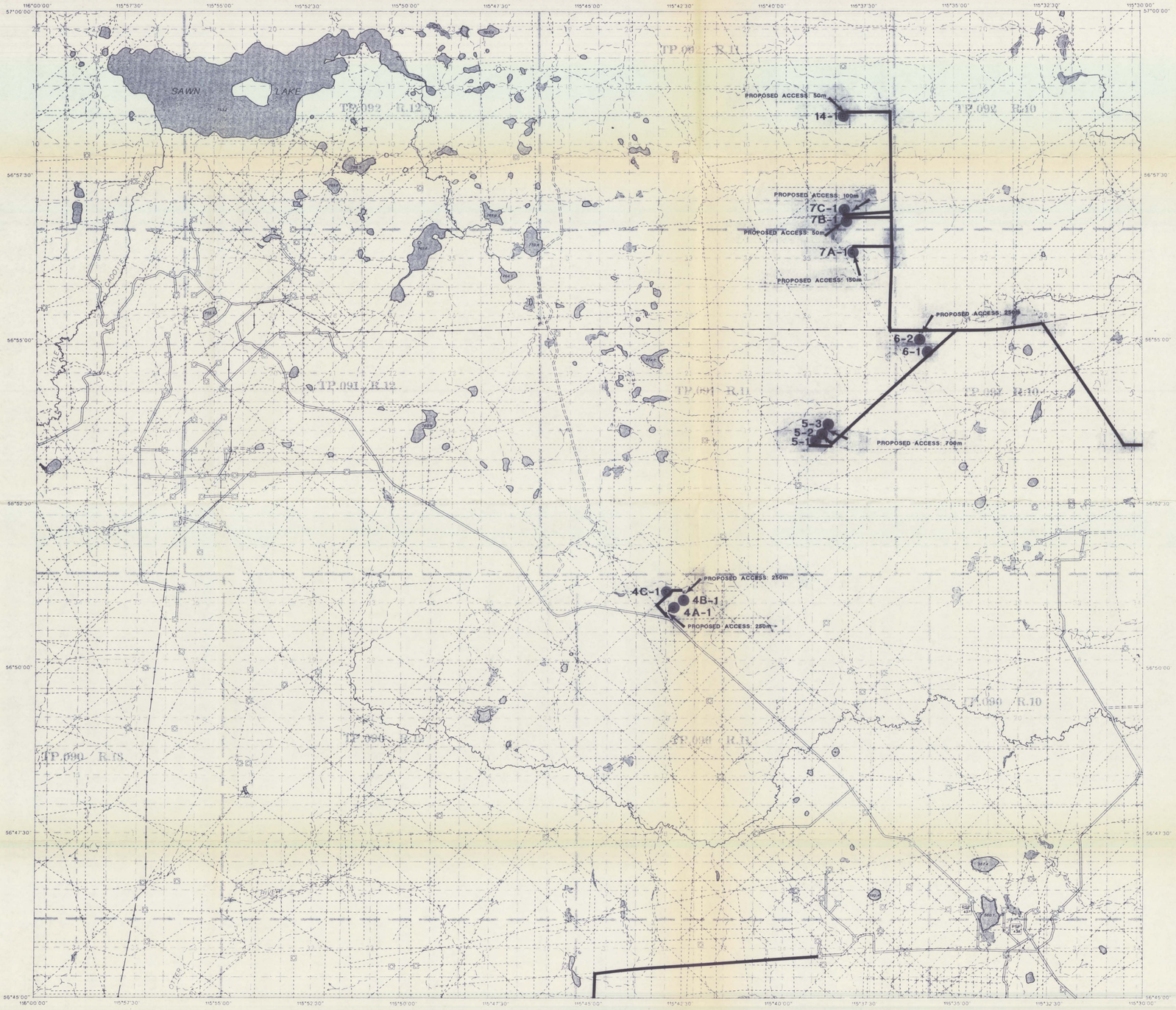

584000E
585000E
586000E
587000E
6310000N
6309000N
6308000N
6307000N
6-2
6-1
BUFFALO HILLS ANOMALY K6
FLAGGED AND/OR HANDCUT GRID
PROPOSED ACCESS
PROPOSED DRILL SITE
SCALE: 1:25000
250 0 250 500 750
(metres)


581500E
582000E
582500E
583000E
583500E
584000E
584500E
6313000N
6312500N
6312000N
6311500N
6311000N
6310500N
6310000N
7C-1
7B-1
7A-1
BUFFALO HILLS ANOMALY K7 A,B,C
FLAGGED AND/OR HANDCUT GRID
PROPOSED ACCESS
PROPOSED DRILL SITE
SCALE: 1:25000
250 0 250 500 750
(metres)


581500E
582000E
582500E
583000E
583500E
6316000N
6315000N
6314000N
14-1
BUFFALO HILLS ANOMALY K14
FLAGGED AND/OR HANDCUT GRID
PROPOSED ACCESS
PROPOSED DRILL SITE
N
SCALE: 1:25000
250 0 250 500 750
(metres)


574000E
575000E
576000E
6290000N
6289000N
6288000N
BUFFALO HILLS ANOMALY K19
FLAGGED AND/OR HAND CUT GRID
PROPOSED DRILL ACCESS
PROPOSED DRILL SITE
SCALE: 1:25000
250 0 250 500 750
(metres)
N

SHEET NO. 84-B-13



SHEET NO. 84-B-13

EXISTING ACCESS

PROPOSED ACCESS

PROPOSED DRILL HOLE

Alberta
ENVIRONMENTAL PROTECTION
Resource Information Management Branch

RESOURCE ACCESS MAP
1:50 000

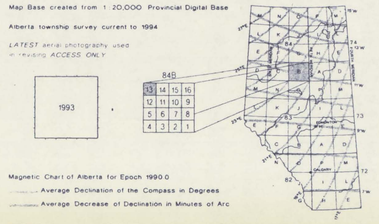
- Highway Designation - Primary / Secondary
- Hard Surface - All weather
- Loose or Stabilized Surface - All weather (Main route)
- Loose or Stabilized Surface - All weather
- Loose Surface - Dry weather
- Truck Trail
- Seismic Line, Trail, Cutline
- Highway Interchange
- Bridge
- Ford Crossing (Subject to Conditions)
- Railway, Railway Point
- Railway (Abandoned, Condition or use unknown)
- Pipeline
- Transmission Line (Major)
- Communication Tower (100 metres*)
- Lookout Tower
- Recreation Area
- Forest Headquarters
- Heliport (Transport Canada)
- Ranger Station
- Airfield - Elevation and Length (A.S.L.) in hundreds of feet (hundreds of metres in brackets) — 28 40 (91 122)
- Airstrip (Condition unknown)
- Township Line - Surveyed
- Township Line - Unsurveyed
- Section Line - Surveyed/Unsurveyed
- Quarter Section Line with Section Number
- Major River
- Perennial River or Stream
- Intermittent or Indefinite Stream
- Lake (Water level in metres A.S.L.)
- Intermittent Lake
- Sand or Gravel Bar
- Oil and Gas Activity Site
- Clearing (Manmade) — Clg
- Permanent Sample Plots (P.S.P.) — PSP
- Mill Site — MS
- Gravel Pit, Sand Pit, Mine or Quarry

PRODUCED DECEMBER 1994 (Second Edition Access Update)

Map Base created from 1:20,000 Provincial Digital Base

Alberta township survey current to 1994

LATEST aerial photography used in revising ACCESS ONLY



Magnetic Chart of Alberta for Epoch 1990.0

Average Declination of the Compass in Degrees

Average Decrease of Declination in Minutes of Arc

NOTE Information as depicted, is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

SCALE 1 : 50 000

WEST OF THE FIFTH MERIDIAN

Kilometres 0 1 2 3 4 5 6 Kilometres
Miles 0 ½ 1 2 3 Miles

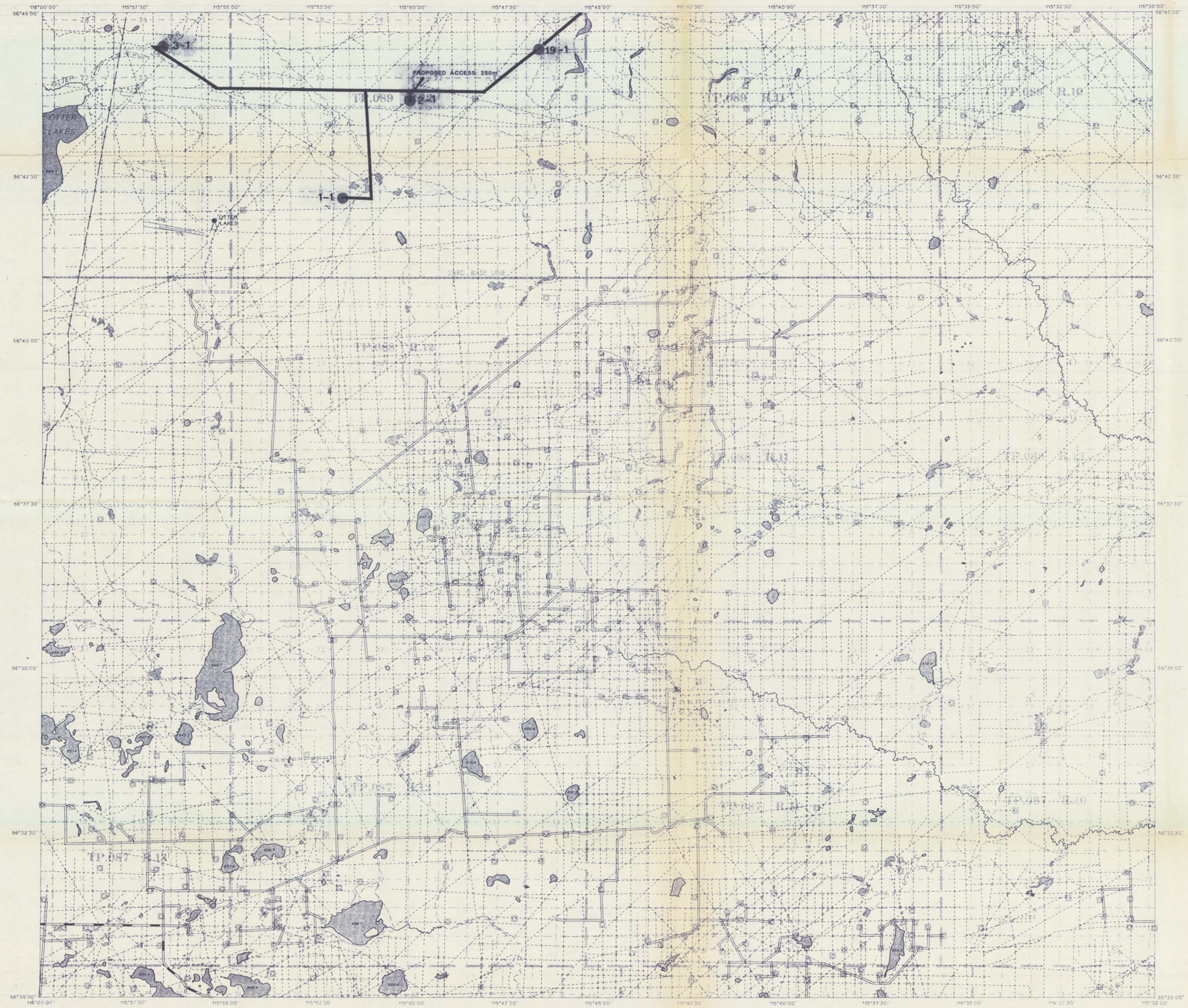
Universal Transverse Mercator Projection

Produced by Resource Information Management Branch, Land Information Division and is intended for internal use by Alberta Environmental Protection.

SHEET NO. 84-B-12

Alberta
ENVIRONMENTAL PROTECTION
Resource Information Management Branch

RESOURCE ACCESS MAP
1:50 000



SHEET NO. 84-B-12

EXISTING ACCESS

PROPOSED ACCESS

PROPOSED DRILL SITE

Highway Designation - Primary / Secondary ..... 72 / 627
Hard Surface - All weather .....
Loose or Stabilized Surface - All weather (Main route) .....
Loose or Stabilized Surface - All weather .....
Loose Surface - Dry weather .....
Truck Trail .....
Seismic Line, Trail, Cutline .....
Highway Interchange .....
Bridge .....
Ford Crossing (Subject to Conditions) .....
Railway, Railway Point .....
Railway (Abandoned, Condition or use unknown) .....
Pipeline .....
Transmission Line (Major) .....
Communication Tower (100 metres+) .....
Lookout Tower .....
Recreation Area .....
Forest Headquarters .....
Heliport (Transport Canada) .....
Ranger Station .....
Airfield - Elevation and Length (A.S.L.) in hundreds of feet (hundreds of metres in brackets) 28 40 (9) (12)
Airstrip (Condition unknown) .....
Township Line - Surveyed .....
Township Line - Unsurveyed .....
Section Line - Surveyed/Unsurveyed .....
Quarter Section Line with Section Number .....
Major River .....
Perennial River or Stream .....
Intermittent or Indefinite Stream .....
Lake (Water level in metres A.S.L.) 640.0
Intermittent Lake .....
Sand or Gravel Bar .....
Oil and Gas Activity Site .....
Clearing (Manmade) ..... Clg
Permanent Sample Plots (P.S.P.) ..... PSP ATC
Mill Site ..... MIL
Gravel Pit, Sand Pit, Mine or Quarry .....

PRODUCED JANUARY 1995 (Second Edition Access Update)

Map Base created from 1:20,000 Provincial Digital Base

Alberta township survey current to 1994

LATEST aerial photography used in creating *ACCESS ONLY*

1993

84 B

13	14	15	16
12	11	10	9
5	6	7	8
4	3	2	1

Magnetic Chart of Alberta for Epoch 1990.0

Average Declination of the Compass in Degrees

Average Decrease of Declination in Minutes of Arc

NOTE Information as depicted, is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

SCALE 1 : 50 000

WEST OF THE FIFTH MERIDIAN

Kilometres 0 1 2 3 4 5 6 Kilometres
Miles 0 ½ 1 2 3 Miles

Universal Transverse Mercator Projection

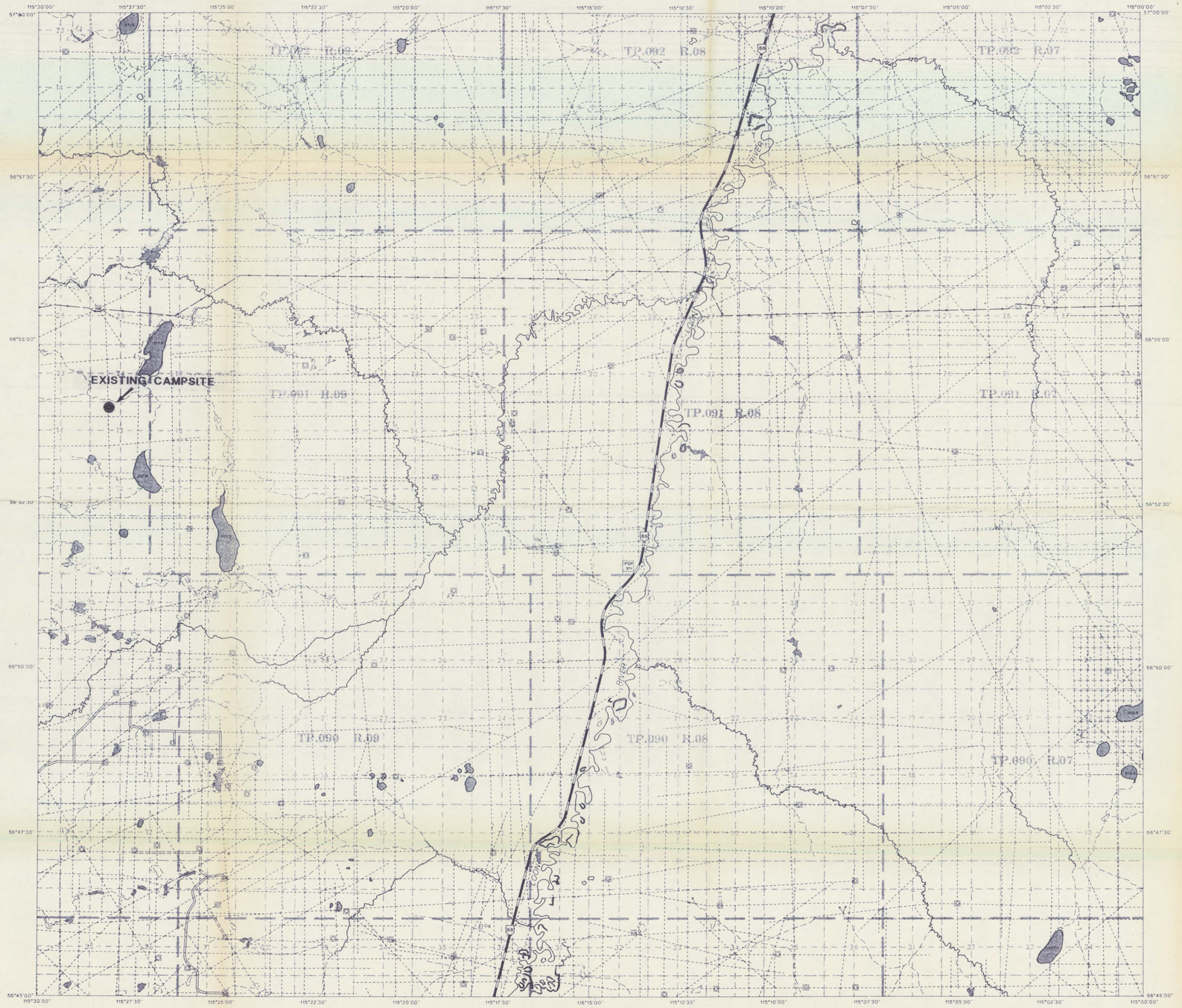
JUL 1993

SHEET NO. 84-B-14

MAP TOWN
10815 - 100 Ave. N.W.
Edmonton, AB T5J 4X4
Tel. 429-2600

Alberta
ENVIRONMENTAL PROTECTION
Resource Information Management Branch

RESOURCE ACCESS MAP
1:50 000



Highway Designation - Primary / Secondary — 72 / 627
Hard Surface - All weather
Loose or Stabilized Surface - All weather (Main route)
Loose or Stabilized Surface - All weather
Loose Surface - Dry weather
Truck Trail
Seismic Line, Trail, Cutline
Highway Interchange
Bridge
Ford Crossing (Subject to Conditions)
Railway; Railway Point
Railway (Abandoned, Condition or use unknown)
Pipeline
Transmission Line (Major)
Communication Tower (100 metres+)
Lookout Tower
Recreation Area
Forest Headquarters
Heliport (Transport Canada)
Ranger Station
Airfield - Elevation and Length (A.S.L.) in hundreds of feet (hundreds of metres in brackets) — 28 40 (9) (12)
Airstrip (Condition unknown)
Township Line - Surveyed
Township Line - Unsurveyed
Section Line - Surveyed/Unsurveyed
Quarter Section Line with Section Number — 24
Major River
Perennial River or Stream
Intermittent or Indefinite Stream
Lake (Water level in metres A.S.L.)
Intermittent Lake
Sand or Gravel Bar
Oil and Gas Activity Site
Clearing (Manmade) — Clg
Permanent Sample Plots (P.S.P.) — PSP 432
Mill Site — M.S.
Gravel Pit, Sand Pit, Mine or Quarry

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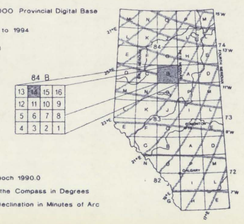
LATEST aerial photography used in revising ACCESS ONLY

1993

84 B



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