MAR 19890003: MAYBELLE RIVER

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GEOLOGICAL AND GEOPHYSICAL REPORT

ON PERMIT 6879030003, N.E. ALBERTA
IN TOWNSHIP 113, RANGE 6, W4M

by

A. A. BROWN, P. Geol.
D. J. SLACK

19800003

Field work done between May 25 and June 4, 1979
Report prepared March, 1980

NBOG.

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LIST OF FIGURES

1.0 SUMMARY

During late May and early June, 1979, a programme consisting of airborne electromagnetic, and gamma spectrometer surveys and ground electromagnetic and induced polarization surveys along with geologic mapping and prospecting was carried out on Quartz Mineral Exploration Permit 6879030003 in northeastern Alberta, about 12 km northeast of Ft. Chipewyan on Lake Athabasca. Interest in the property is based on the presence of airborne EM conductors in basement lithologies and along the shore of Lake Athabasca under what may be the Helikian Athabasca sandstone.

Mapping of the property has shown it to be underlain primarily by Archean(?) granitic gneisses with a minor occurrence of metasedimentary rocks in the NE end of the property. This occurrence was geophysically evaluated and found to have a VLF conductor immediately north of the outcrop, probably due to disseminated pyrite, however, poor ground contact and high magnetotelluric noise prevented conclusive IP follow-up of this zone. Two radiometric anomalies located by the airborne gamma spectrometer survey were found to be caused by minor uranium secondary mineralization in a quartz monzonite. No other uranium mineralization was found during the programme, and no Helikian sandstone was found in outcrop on the property.

2.0 CONCLUSIONS

1) The airborne radiometric anomalies located are due to uranium secondary mineralization in quartz monzonite and do not represent economic uranium mineralization.

2) The majority of airborne EM conductors located on land are due to conductive overburden effects.

3) The VLF-EM anomaly located is due to disseminated pyrite in a metaquartzite/meta-argillite unit in Archean basement rocks, and may be of further interest.

4) Ground IP results are inconclusive due to poor ground contact and high magneto-telluric noise.

5) The Helikian Athabasca sandstone does not outcrop on the property.

3.0 RECOMMENDATIONS

It is recommended that a winter geophysical programme, including IP, magnetometer and gravity surveys, be conducted on an offshore grid oriented to cover the airborne EM anomalies (M, N & O - Fig. 4), located in 1979 and the offshore extension of the VLF conductor located in the NE part of the permit.

4.0 INTRODUCTION

Quartz Mineral Exploration Permit #6879030003 consisting of the NW¼ of Section 3, the N½ and SW¼ of Section 4, Section 5, the W½ of Section 8, the S½ and NE¼ of Section 10, the NW¼ of Section 11, and Section 14 of Township 113, Range 6, West of the 4th Meridian, covers approximately 1,165 ha (2,880 acres) on the north shore of Lake Athabasca, NE Alberta (Fig. 1).

Hudson's Bay Oil and Gas Company Limited, of 700 Second Street S. W., Calgary, Alberta, was granted the permit by Alberta Energy and Natural Resources under the Quartz Mining Regulations on March 15, 1979.

Exploration in May and June, 1979, consisted of an airborne gamma spectrometer survey (AGS), geological mapping and prospecting, and ground electromagnetic, induced polarization and radiometric surveys.

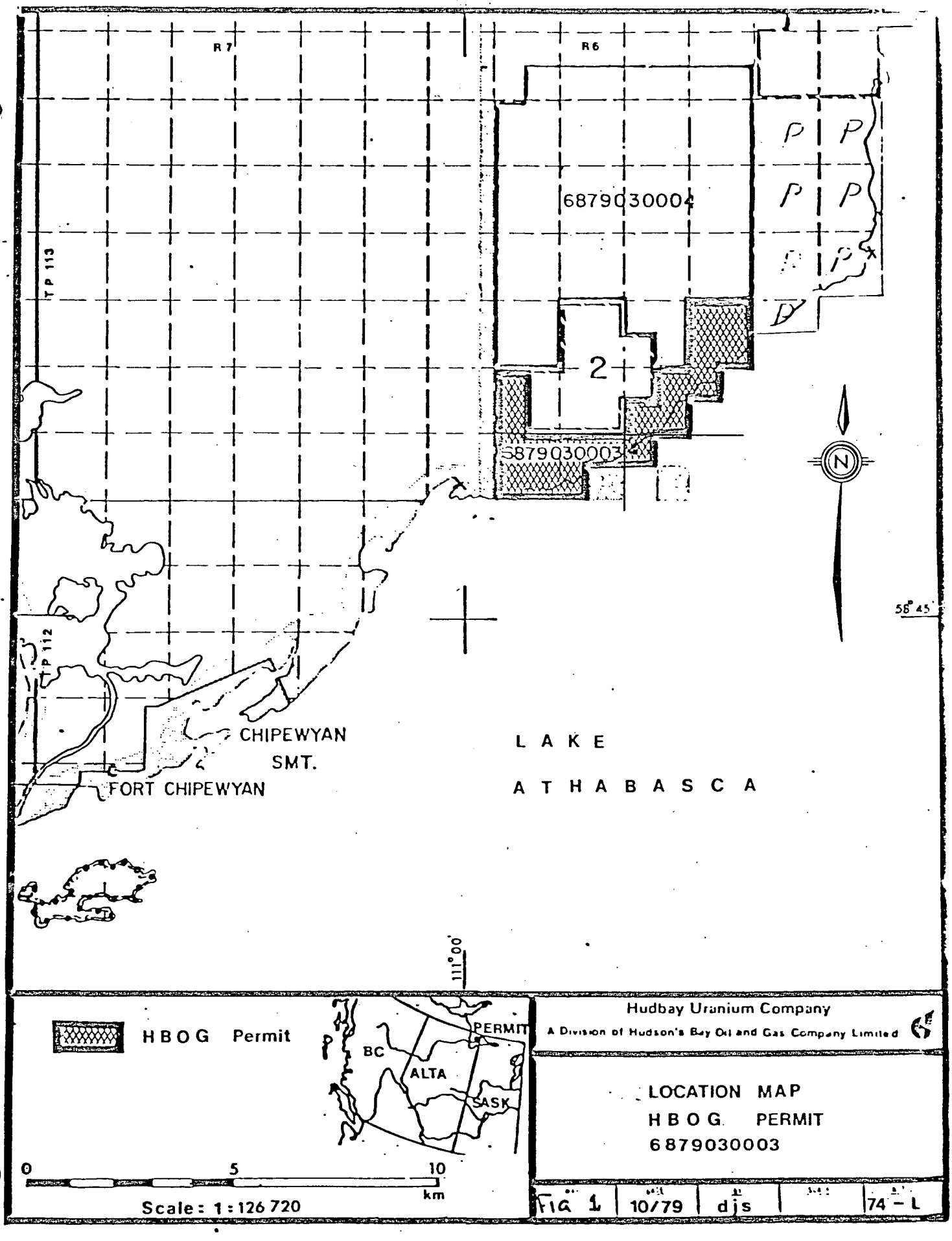
5.0 LOCATION AND ACCESS

Permit 6879030003 is located about 12 km (7.5 mi.) north and east of Fort Chipewyan on the north shore of Lake Athabasca in northeast Alberta (Latitude $58^{o}47'30"N$, Longitude $110^{o}55'30"W$) (Fig. 1).

Access to the property is provided by float or ski equipped aircraft from Fort Smith, Fort Chipewyan or Uranium City or by helicopter from Fort Chipewyan. During the winter the property may be accessed by snow machine from Ft. Chipewyan.

The 1979 programme was mobilized on May 25, 1979, by Hughes 500D helicopter from Hudson's Bay Oil and Gas Permit 244, approximately 80 km (50 mi.) to the northeast. A tent camp was set up at the mouth of the small creek as shown in Fig. 3.

The camp was demobilized to Fort Chipewyan airport on June 4, 1979, with the aid of the Hughes 500D helicopter.


R7
R6
TP 113
TP 112
6879030004
6879030003
2
P
P
P
P
P
P
P
N
58° 45'
CHIPEWYAN
SMT.
FORT CHIPEWYAN
L A K E
A T H A B A S C A
111° 00'
HBOG Permit
BC
ALTA
SASK
PERMIT
0
5
10
km
Scale: 1:126 720
Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited
LOCATION MAP
HBOG PERMIT
6879030003
Fig 1
10/79
djs
74 - L

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6.0 PHYSIOGRAPHY

The western half of the permit area consists of highly fractured rocky upland with sparse overburden cover, raised 15-25 m above lake level. The eastern half consists of much flatter outwash sands and gravels with numerous remnant beaches and only scattered outcrops of granitic gneiss.

7.0 CLIMATE

At the outset of the project in early May, scattered areas of snow cover were observed. The low areas were extremely wet and the small and intermittent creeks were all water-filled. The weather was generally clear with seasonable, above freezing temperatures being recorded for the entire length of the project.

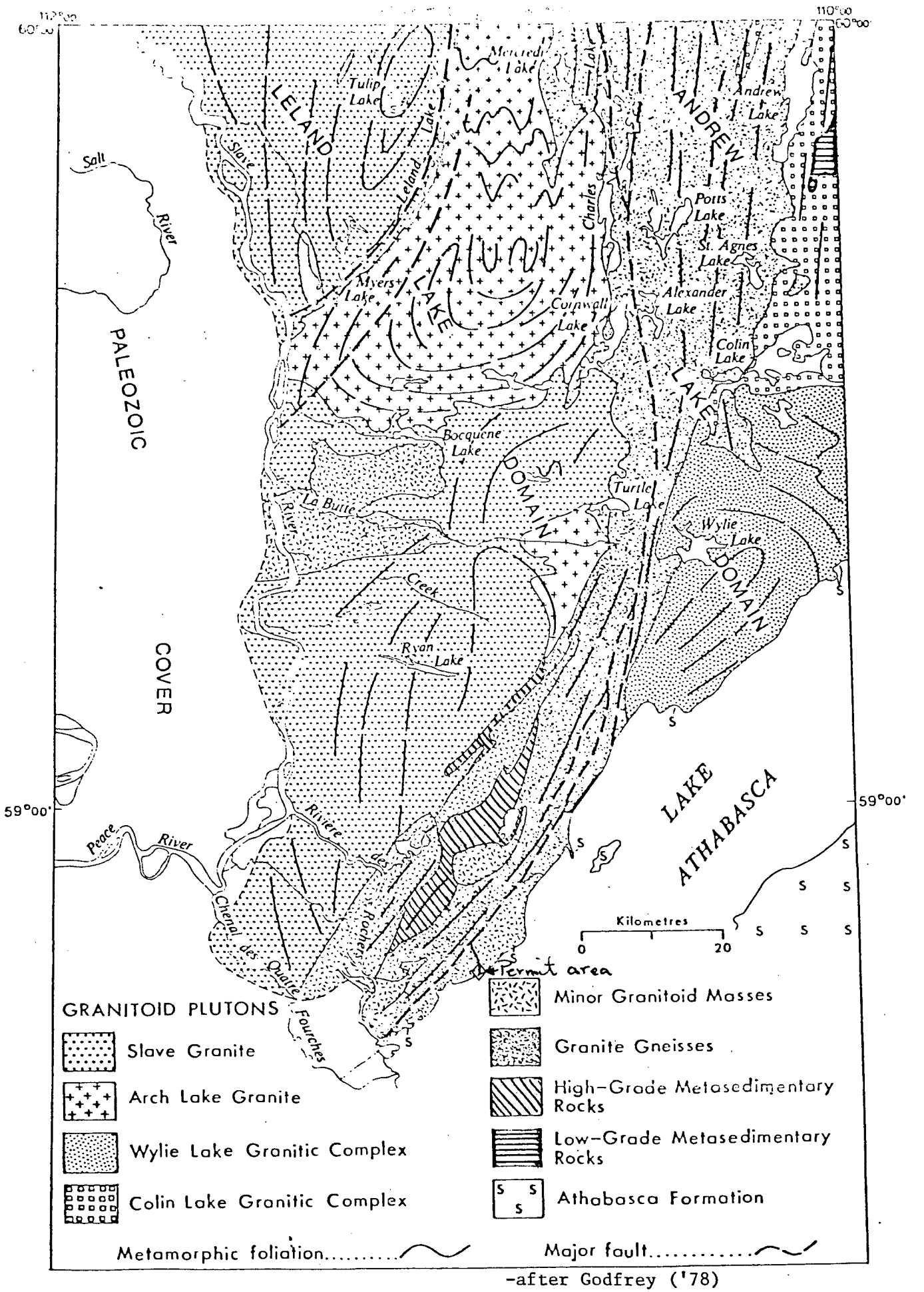
8.0 HISTORY

Prior to the acquisition of the permit area by HBOG no previous work on behalf of mineral exploration companies on the property is known to the author. Government geological mapping of the area, however, indicates that subcrops of the Helikian Athabasca formation may occur in overburden covered areas, especially in the eastern area of the property. This, coupled with the presence of known uranium showings in basement lithologies inland of the permit area, led to the acquisition of the permit.

9.0 GEOLOGY

9.1 REGIONAL GEOLOGY

Quartz Mineral Exploration Permit 6879030003 is located near the western edge of the Churchill Structural Province of the Precambrian Shield. In general, the area consists of highly metamorphosed foliated granitoid intrusives, granite gneisses and metasedimentary rocks of the Archean to upper Aphebian eras. This whole sequence is in turn unconformably overlain to the east by unmetamorphosed Helikian sediments of the Athabasca Formation (Fig. 2, Table 1).



-after Godfrey ('78)

REGIONAL GEOLOGY
Figure 2

19800003

ERA	FORMATION	LITHOLOGIES
PLEISTOCENE AND RECENT	SWAMP AND BOG DEPOSITS/GLACIAL PERIGLACIAL DEPOSITS	PEAT, SANDS AND GRAVEL
	UNCONFORMITY	
HELIKIAN	ATHABASCA FORMATION	UNMETAMORPHOSED SANDSTONE
	UNCONFORMITY	
APHEBIAN/ ARCHEAN	ANDREW LAKE DOMAIN	HIGHLY METAMORPHOSED GRANITOID PLUTONICS AND MIGMATITES

TABLE OF FORMATIONS

TABLE I

The gneissic terrain probably represents a mobile zone which initially developed during the Archean. This zone has been remobilized and deformed by the Hudsonian orogeny (ca. 1800 m.y.). Subsequent uplift and erosion has exposed the deep seated plutons and disconnected the mantling gneissic and metasedimentary units.

9.2 DETAILED GEOLOGY

Detailed mapping of the permit revealed a series of highly metamorphosed granitoid and sedimentary rocks.

The property can be roughly divided into two parts along a NW/SE line represented geographically by a small creek valley immediately to the east of the campsite (Fig. 3). To the west of this line, the topography is fairly rugged and outcrop exposure is excellent. The rocks here are generally migmatitic (probably paragneisses), consisting of various admixtures of granite gneiss (1a) and chlorite gneiss (1b).

To the east, the topography is much more subdued with extensive glacial outwash deposits, and the rocks tend to be more plutonic, consisting of foliated diorites (1d) and biotite gneisses (1e).

Thus, it appears that the property is underlain by a dioritic intrusive complex, overlain by a mantle of granite-chlorite paragneiss.

One minor exposure of metasedimentary rocks was located during mapping (unit 2). This outcrop consists of interbedded metaquartzite and meta-argillite with minor disseminated pyrite. The beds have nearly vertical dips and generally strike into the lake, A moderate VLF cross-over is associated with this outcrop.

The entire permit area is intensely fractured, generally along a N-S and NE-SW trend. Some fractures are hematized and display slightly above background radiometric readings. However, no uranium mineralization was observed

in any fracture during any of the surveys carried out on the property.

10.0 GEOPHYSICS

10.1 AIRBORNE SURVEYS

(i) Airborne Electromagnetics

Hudson's Bay Oil and Gas Company Limited contracted Questor Surveys Ltd. to fly an area north and east of Fort Chipewyan, Alberta, including the area covered by Permit 6879030003 (Fig. 4). The survey was undertaken in late March, 1979, and constituted approximaely 55 line km of flying over the permit area.

A total of 16 anomalies were detected by the survey*, the vast majority of which are directly attributable to conductive overburden and "swamp edge" effect, as outlined in Table II.

Anomalies M, N and O, however, are of sufficient strength that they may be related to a bedrock conductor, and are therefore of further interest.

(ii) Airborne Gamma Spectrometry (AGS)

In late May, 1979, an airborne gamma spectrometer survey was flown over the permit area (Fig. 5). the survey consisted of grid flying on lines oriented at 320^{o} at a spacing of 250 m. A Hughes 500-D helicopter with the HBOG-AGS system was used for the survey (Appendix III).

Only two anomalies were detected, the first located between fiducials 137 and 138 and the second between fiducials 140 and 141 (Fig. 5 & 6). The AGS system was used to relocate both anomalies which were found to be caused by a single outcrop of quartz monzonite protruding from an area of wet muskeg. Full (256 channel) spectra of the anomalies were retrieved using the ground processing unit (GPU) capabilities of the HBOG-AGS system (Figures 7 & 8). This allows for a direct comparison of the Bi^{214} (U), K^{40}, and Tl^{208} (Th) content of the rock.

*NOTE: Data interpretation by HBOG personnel

ANOMALY NO.	LINE NO.	CHANNELS	REMARKS
A	40080	2	Probably caused by conductive overburden
B	40100	4	Probably caused by conductive overburden
C	40100	2	Probably caused by conductive overburden
D	40110	4	Probably caused by conductive overburden
E	40120	3	Probably caused by conductive overburden
F	40120	4	Probably caused by conductive overburden
G	40130	3	Probably caused by conductive overburden
H	40140	2	Probably caused by conductive overburden
I	40140	2	Probably caused by conductive overburden
J	40150	2	Probably caused by conductive overburden
K	40160	2	Probably caused by conductive overburden
L	40160	2	Probably caused by conductive overburden
M	40200	6	Possible bedrock
N	40220	6	Possible bedrock
O	40230	5	Possible bedrock
P	40310	2	Probable conductive overburden

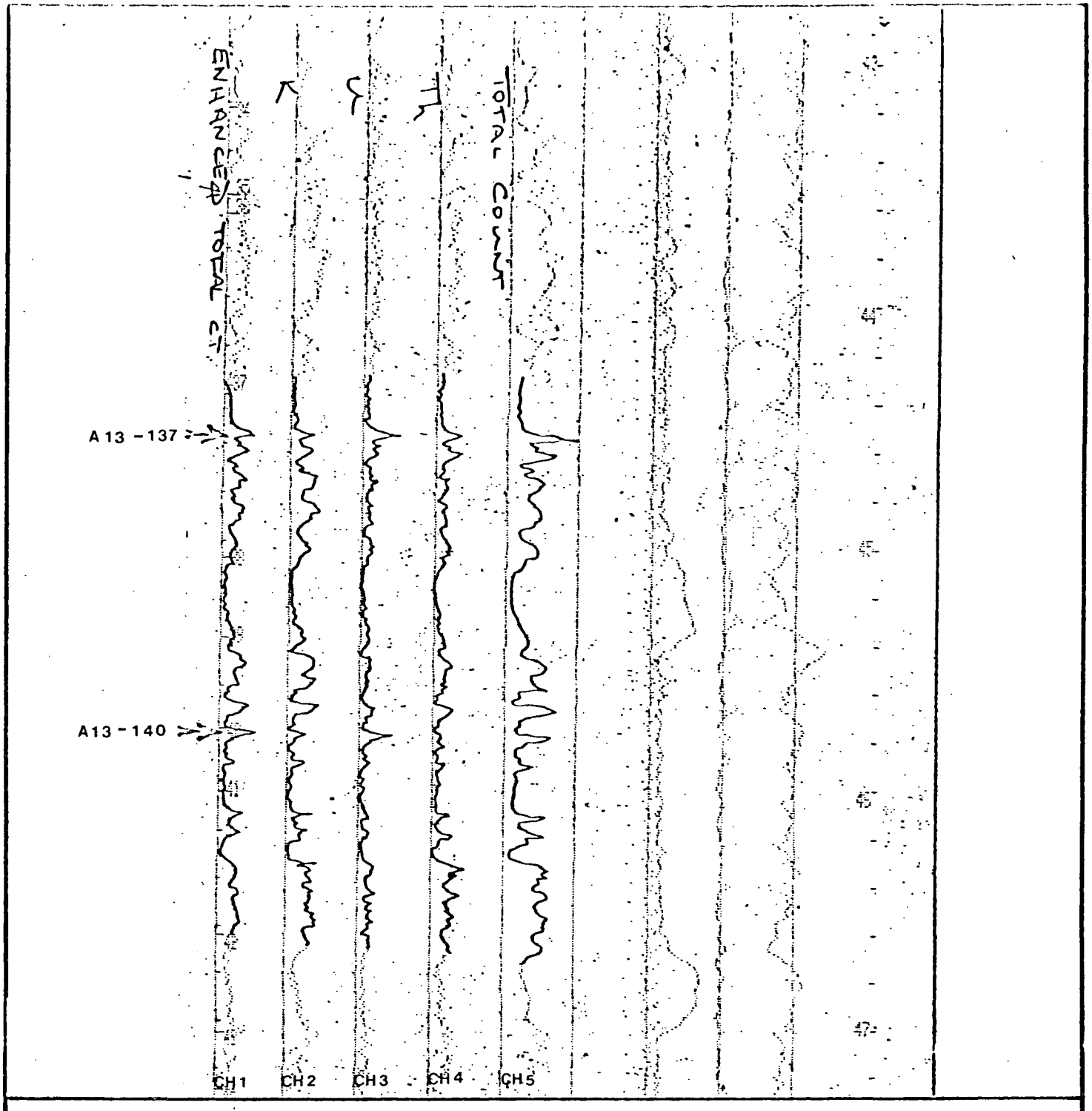
AIRBORNE EM ANOMALIES

TABLE II

ANOMALY NUMBER	COUNTS Total	K	U	Th	RATIOS U/K	U/Th	K/Th	TIMES BACKGROUND U/K	U/Th	K/Th	Remarks
A 13-137	14513	307	229	177	0.75	1.29	1.73	3.75	1.61	0.43	-Quartz Monzonite outcrop - minor U secondary mineralization
A 13-140	9467	264	194	82	0.73	2.37	3.22	3.65	2.96	0.81	-Same outcrop
BACKGROUND	3570	93	36	63	0.39	0.57	1.48	-	-	-	

AIRBORNE GAMMA SPECTROMETRY ANOMALIES

TABLE III



LEGEND

CH 1 - 500 cps

CH 2 - 400 cps

CH 3 - 200 cps

CH 4 - 200 cps

CH 5 - 5000 cps

Figure 6

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

A G S Analogue

Flight A-13

MAP	DATE	BY	SCALE	FILE
	02-80	MRM		

19800003

The various ratios and the magnitudes of the anomalies are given in Table III.

10.2 GROUND GEOPHYSICS

The main emphasis of the ground geophysical programme was concentrated around the only exposure of pyritiferous metasedimentary rocks located on the property. Approximately 3 km of VLF-EM and 5 km of Induced Polarization/Resistivity survey were completed in the vicinity of this outcrop.

(i) VLF-EM

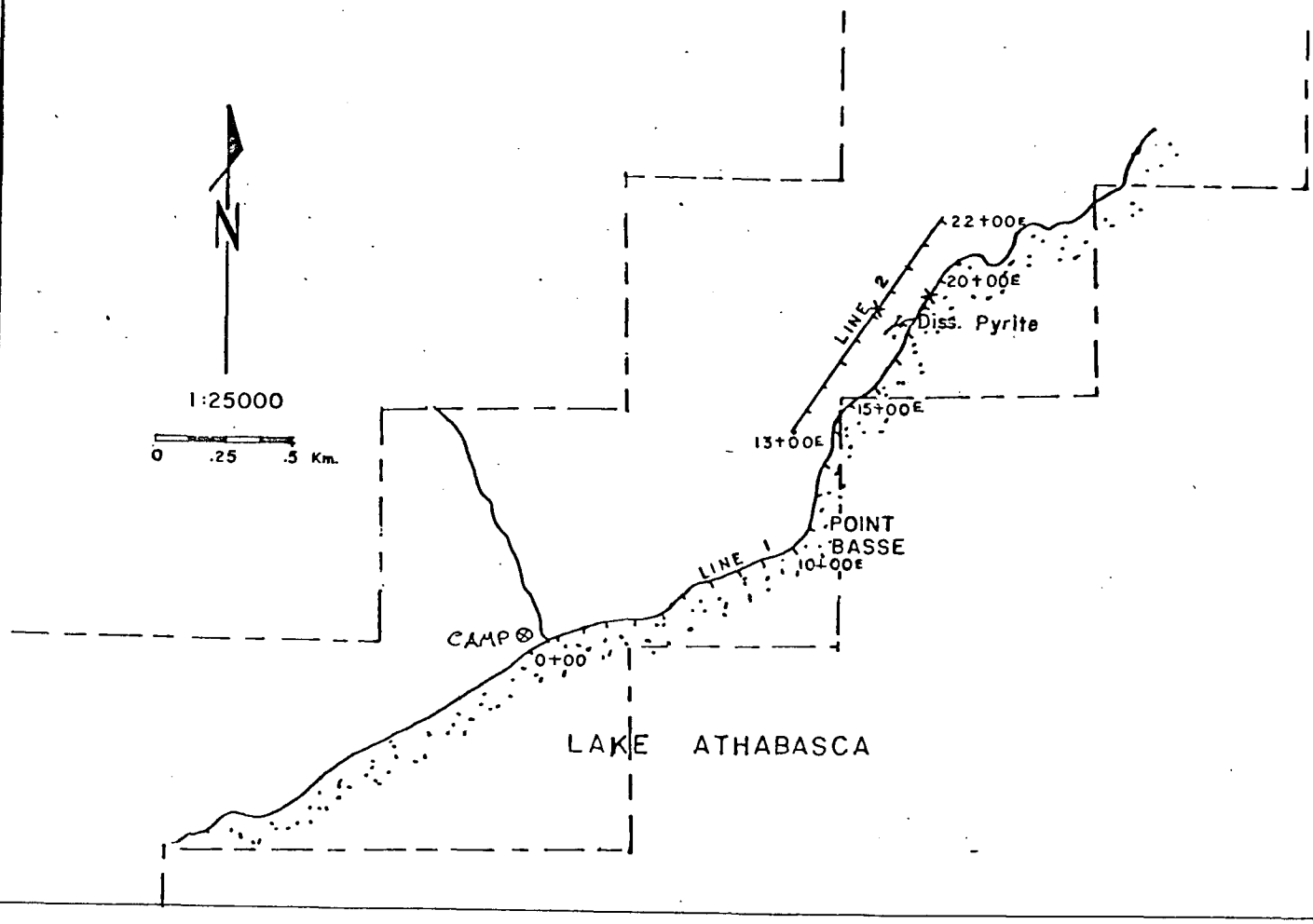
A Crone Radem VLF-EM instrument was used to take dip angle readings at 100 m intervals along pace and compass lines oriented along and subparallel to the Lake Athabasca shoreline (Fig. 9).

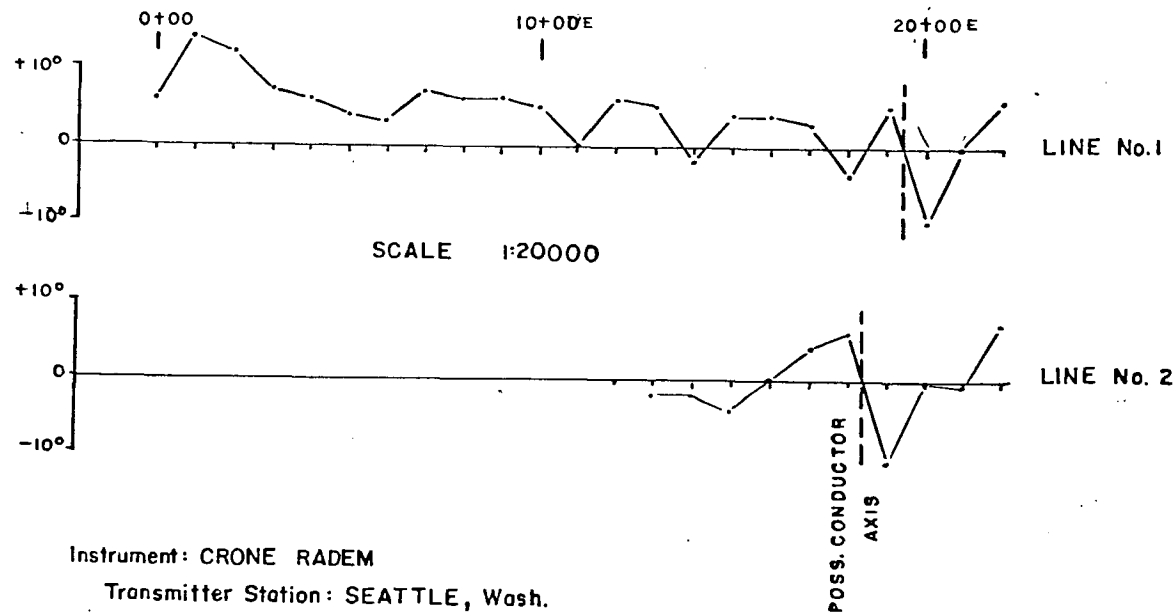
Dip angle readings range in value from +14 degrees to -10^{o}. Two cross-overs were located, one at 19+50E on Line #1 and another somewhat better defined at 18+40E on Line #2 (Fig. 9). Assuming continuity between these two lines, the centre of the anomaly strikes E-W toward Lake Athabasca.

(ii) IP-RESISTIVITY

A Crone "Newmont Designed" IP-IV pulse type receiver and a Scintrex IPC-8 250 W Transmitter were used in a 200 m square array. Readings were taken at 100 m intervals on lines approximately 20 m apart along 5 km of grid. Apparent chargeability and apparent resistivity readings were plotted at 1:10,000 (Fig. 10). The high chargeabilities found along line 7+00S are suspect due to very dry ground conditions resulting in low transmitter current output with correspondingly weak receiver signal and strong magneto-telluric interference. It was therefore decided to attempt to confirm these readings by running two further lines at 8+00S and 10+00S using an expanding pole-dipole array to produce a pseudosection through the overburden to bedrock (Fig. 11). The areas of high

chargeabilities were not relocated, but high noise to signal ratios were again encountered causing the data to be suspect.





Instrument: CRONE RADEM

Transmitter Station: SEATTLE, Wash.

Twp 113 R6 W4M

Hudbay Uranium Company

A Division of Hudson's Bay Oil and Gas Company Limited

POINT BASSE

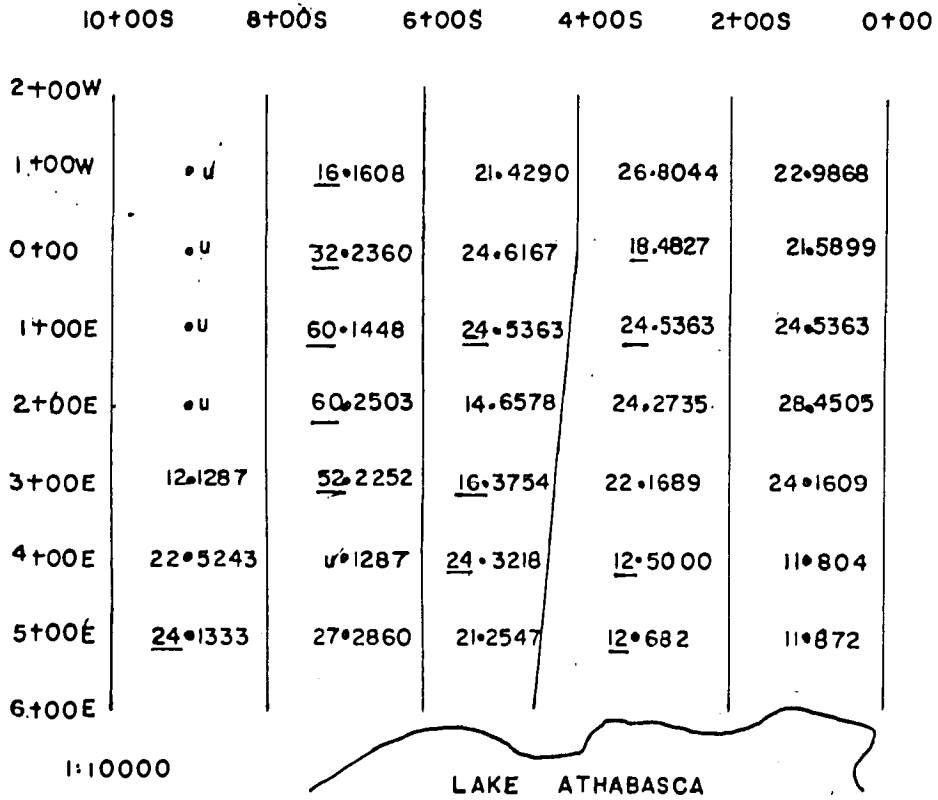
SHORELINE VLE-EM

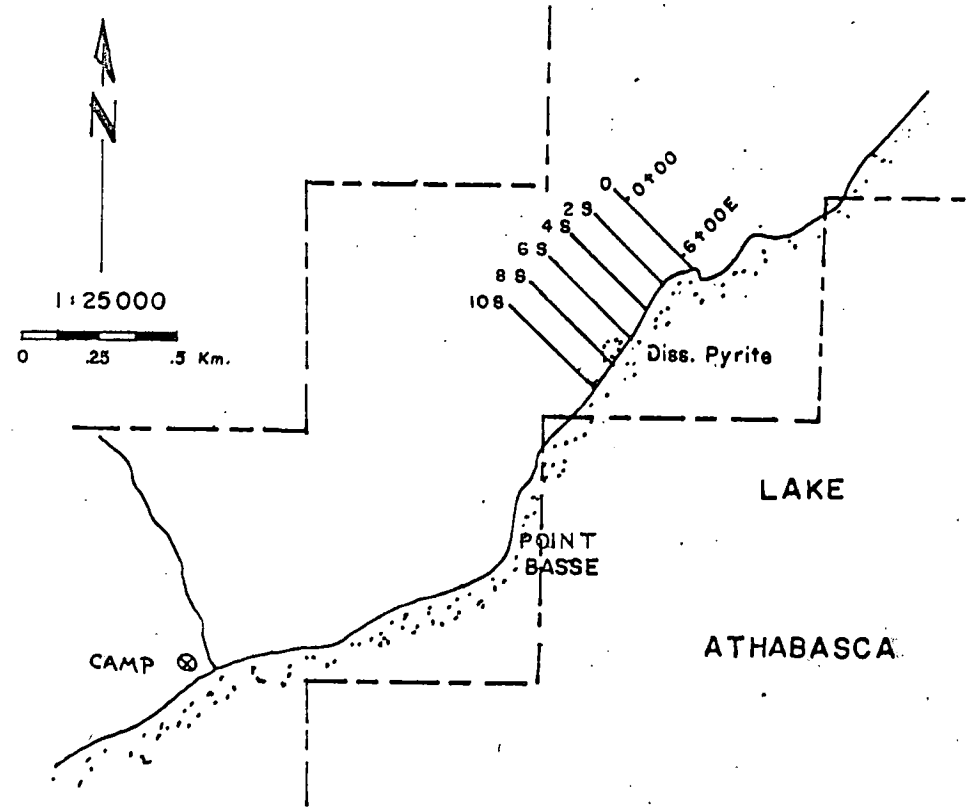
DIP ANGLE

PERMIT 6897030003

MAP	DATE	BY	SCALE	N.T.S.
Figure 9	March '80	R.C.E.		86L/15

19800003



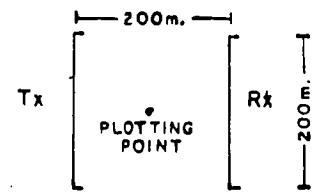


LEGEND

12•1267
APPARENT CHARGEABILITY (milliseconds)
APPARENT RESISTIVITY (ohmmeters)

12 READING SUSPECT DUE TO VERY ACTIVE TELLURIC NOISE AND DRY GROUND CONDITIONS

u UNRELIABLE TELLURIC NOISE



PARALLEL DIPOLE

SPECIFICATIONS

200 m. SQUARE ARRAY
Tx. SCINTREX IPC-8
Rx. CRONE IP-IV NEWMONT TYPE

19800003
OPERATORS: R.C.E. / D.M.

Twp 113 R6 W4M

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

POINT BASSE
I.P./RESISTIVITY

PERMIT 6879030003

MAP	DATE	BY	SCALE	N.T.S.
Figure 10	March '80	G.I.W.		86L/15

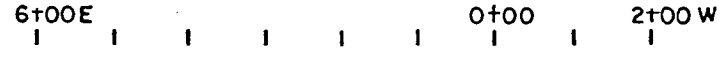
25

PSEUDOSECTION — LINE 10+00S

N2	13. 14. 9. —. 11.	APPARENT
N3	18. 18. 8. 10. 21.	CHARGEABILITY
N4	21. —. 12. 16. 22.	(milliseconds)

LINE 10+00 S

N2	693. 3142. 8035. —. 1885.	APPARENT
N3	1006. 553. 3174. 3249. 2009.	RESISTIVITY
N4	1011. —. 2180. 3468. 1671.	(ohm-meters)



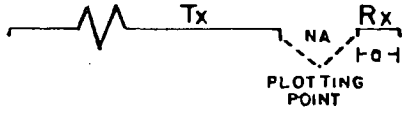
LINE 8+00S

N2 8. 5. 19. 14. 8. 17. 20. APP. CHARGEABILITY (milliseconds)

LINE 8+00S

N2 486. 214. 1602. 2827. 9312. 2280. 2318. APP. RESISTIVITY

POLE-DIPOLE ARRAY



a=50 m.

—. No Reading Due To High Noise Level

Rx — CRONE IP-IV NEWMONT TYPE
Tx — SCINTREX IPC-8, .250 Watt

19800003
Twp 113 R6 W4M

OPERATOR: R. Everett
M. Kilby

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

POINT BASSE

IP/RESISTIVITY

PERMIT 6879030003

No.	DATE	BY	SCALE	N.T.S.
Figure 11	March '80	G.I.W.		86L/15

REFERENCES

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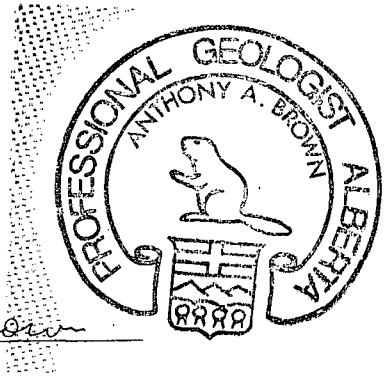
Respectfully Submitted:



A. A. BROWN
Manager, Uranium Exploration

[redacted]

D. J. SLACK
Geologist

STATEMENT OF EXPENDITURES

APPENDIX I

HUDSON'S BAY OIL AND GAS COMPANY LIMITED

QUARTZ MINERAL EXPLORATION PERMIT 6879030003

I, ALFRED RAYMOND TRAVERS, of the City of Calgary, in the Province of Alberta, HEREBY CERTIFY:

1. THAT I am Controller for HUDSON'S BAY OIL AND GAS COMPANY LIMITED and as such have a personal knowledge of the matters herein contained.

2. THAT HUDSON'S BAY OIL AND GAS COMPANY LIMITED has incurred costs for mineral exploration work relating to the above Quartz Mineral Exploration Permit pursuant to the Quartz Mining Regulations, during the period March 15, 1979, to March 15, 1980, as follows:

Salaries and Wages	$ 6,176.41
Materials and Supplies	325.35
Fuel	540.00
Contract Surveys	1,328.25
Camp Expenses	484.95
Rotary Wing	3,759.25
Fixed Wing Charter	2,699.27
Equipment Rental	1,718.00
Miscellaneous Expenses & Overhead	1,703.15
Total	$18,734.63

3. I hereby certify that the above statements are true.

[redacted]

LIST OF PERSONNEL

APPENDIX II

QUARTZ MINERAL EXPLORATION PERMIT 6879030003

LIST OF PERSONNEL

NAME & ADDRESS	POSITION	DAYS	RATE
[redacted]	Geologist	10	$92.00
[redacted]	Senior Geologist	4	142.56
[redacted]	Sr. Geophy. Tech.	11	78.17
[redacted]	Geophy. Tech.	4	75.94
[redacted]	Temporary Geologist	11	61.97
[redacted]	Geophy. Assistant	11	61.68
[redacted]	"	11	44.65
[redacted]	"	11	45.84

NAME & ADDRESS	POSITION	DAYS	RATE
[redacted]	Geophy. Consultant	1	$300.00
[redacted]	Geologist	2	92.00
[redacted]	Sr. Staff Geologist	1	143.00
Drafting Services (HBOG)		4.5	120.00
Total Days		81.5	
Total Salaries		$6,176.41	

INSTRUMENT SPECIFICATIONS

APPENDIX III

HBOG GAMMA RAY SPECTROMETER

SPECIFICATION SHEET

Data acquisition system based on TMS 9900 Micro processor 256 channel full spectrum spectrometer with Automatic Compton Stripping

Sampling Rate 1 second

1,000 $in.^3$ X-square NaI crystal package (Harshaw)

CRT: Allows continuous monitoring of analogue signal, digital signal and channel drift, based on a 4 minute accumulated peak of K-40

PRINTER: Programmable, prints analogue channels of Enhanced Total Count, K-40, Bi-214, Tl-208, Total Count and Altimeter

ANALOGUE CHANNEL WINDOWS:

Enhanced Total Count	Total Count Channel biased to emphasize Bi-214 responses
K-40 - Channel 117-127	(1.36 MeV - 1.56 MeV)
Bi-214-Channel 144-152	(1.66 MeV - 1.86 MeV)
Tl-208-Channel 210-226	(2.40 MeV - 2.76 MeV)
Total Count Channel 10-255	(0.12 MeV - 3.05 MeV)

DATA STORAGE: ½" (900 Bits/inch) Pertec tape unit (IBM Format)

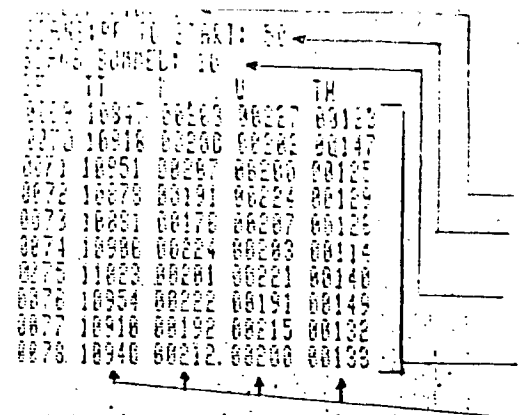
DATA STORED: 256 channels of full gamma spectrum, energy scale approximately 11.5 KeV/channel, Altimeter, Magnetometer, VLF and Real Time clock

PLATFORM: Hughes 500-D helicopter
Crystal package mounted in belly pod

LEGEND

GPU DATA OUTPUT

For Figures 7 & 8



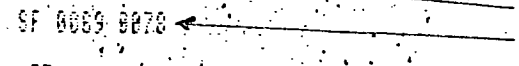
Marker to show start of location

No. of sec. after R.F. that data is being summed from

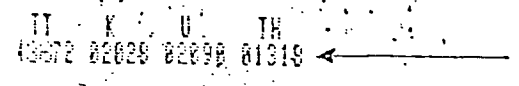
No. of sec. of data summed

Data that is being summed

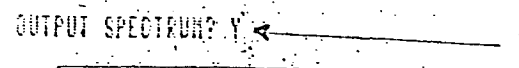
CPS for each window



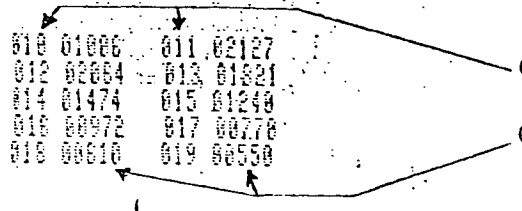
Sample interval summed



Summed counts for each window



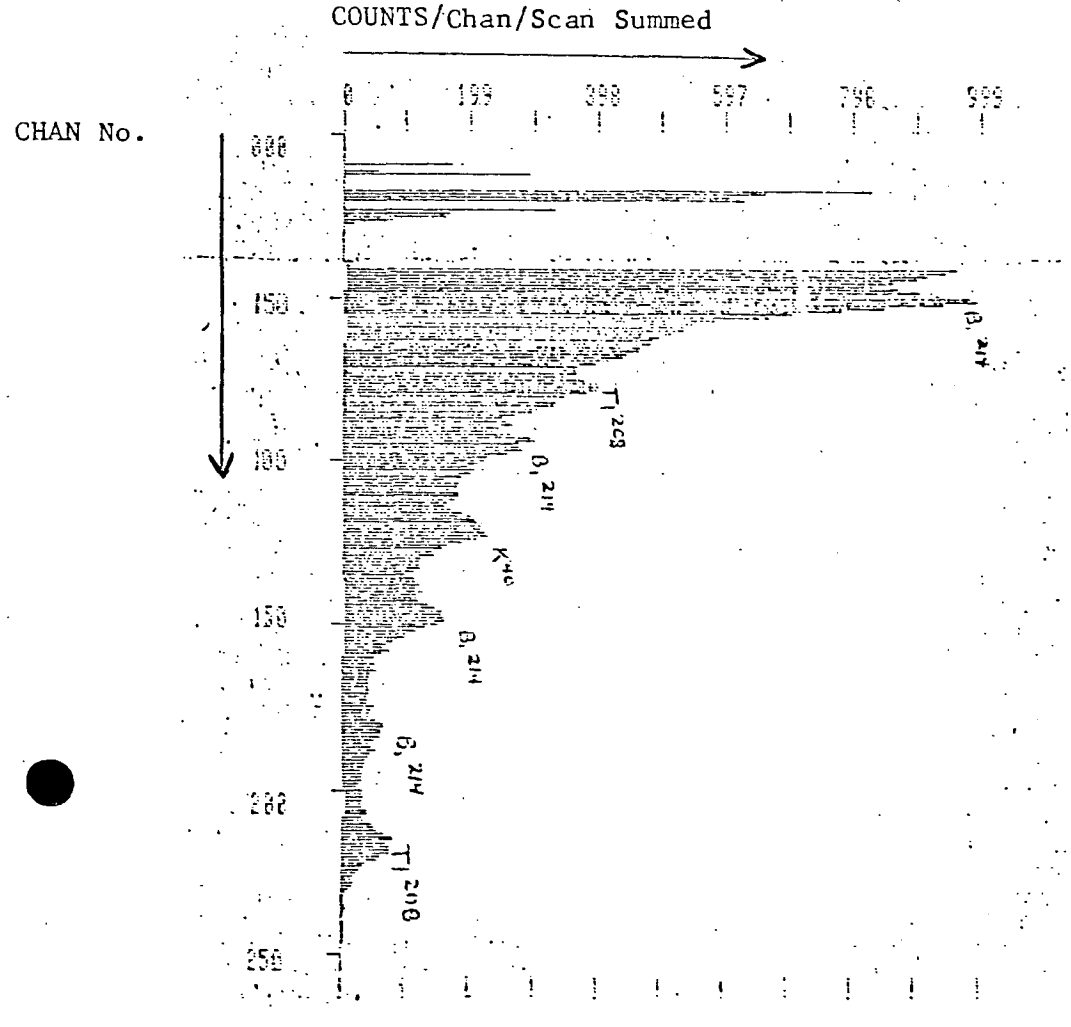
Request for printout of each accumulated X-ray channel Y-Yes N-No



Chan No.

Counts for each chan. accumulated for the above specified time (10 sec.)

Scale at which to display spectrum 999 is full scale

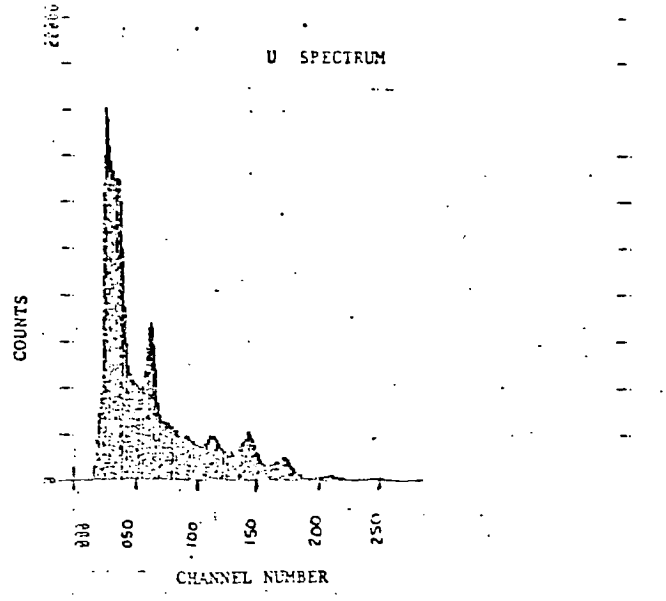


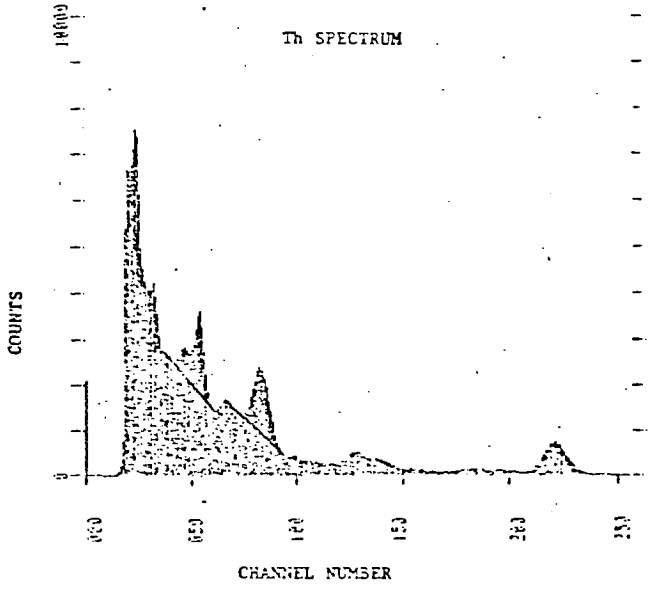
GPU - GROUND PROCESSING UNIT

RF-Random FID-A marker manually placed on the analog chart and tape using a fiducial pedal

SF-Sequential Fid-A marker automatically placed on the analog chart and tape using a real time clock. Sequential fids increase when data is being stored on tape.

TT-Total Count Window
K -Potassium Window
U -Uranium Window
Th-Thorium Window
FLTN Y065 - Flight Number
LINE Y065 - Line Number same as flight no.
SCAN-1 second of data





Examples of Uranium, and Thorium Spectra

Instrumentation

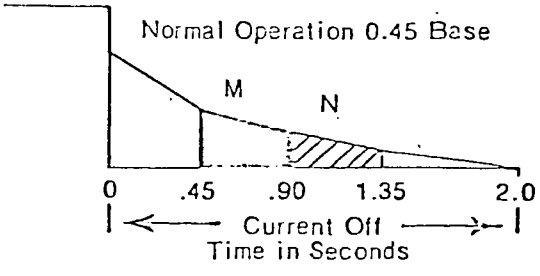
Induced Polarization

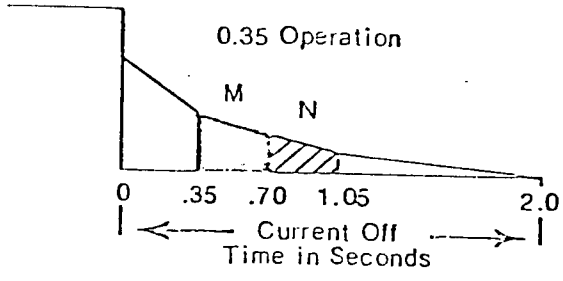
The Crone "Newmont Type" I.P.-IV receiver, manufactured by Crone Geophysics Limited of Mississauga, Ontario, and the Scintrex IPC-8 250W Transmitter, manufactured by Scintrex Limited of Concord, Ontario, were used for the induced polarization survey.

CRONE "NEWMONT DESIGNED" I.P.-IV PULSE TYPE RECEIVER

SPECIFICATIONS

- Primary Voltage "Vp": .0005 to 60 volts, accuracy ±5%
- Standard receivers set for 2.0 seconds on, 2.0 seconds off current cycle. Off period must be greater than 1.8 seconds.
- Chargeability M and N readings directly in milliseconds





- Both M and N readings are automatically corrected to the Newmont 33M1 Standard. M and N readings should be the same with a normal polarization decay. Unequal readings indicates the presence of inductive coupling and then the N reading should be used.

- Both M and N readings are taken for 3 current cycles (6 samples) then they are automatically averaged and stored for direct read out.

- Self Potential: Automatic buckout effective when SP less than .6 Vp
  Manual buckout - 0 to 1.0 volts calibrated
  (1.0 volts uncalibrated)
  Fine SP buckout for low signal levels

- Pot Resistance Check: Check of potential contacts on milli-second meter: Green - good contact; Orange - marginal contact (M-N readings are accurate, Vp and resistivity readings have error); Red - nil or unacceptable contact.

- Input Impedance: 300,000 Ohms
- Noise Filters: 30 DB at 50 or 60 Hz (factory set)
  30 DB/Octave above 8 Hz
  6 CB/Octave above 35 Hz
- Automatic Time Lock to ground signal
- Amplifier drift correction by one control

SCINTREX IPC-8 250W TRANSMITTER

SPECIFICATIONS

POWER:	250W max.
OUTPUT VOLTAGE:	150V to 850V in 5 steps 1.4 ratio
OUTPUT CURRENT:	1.5A max.
METRE RANGES:	0-0.5 A.F.S. and 0-1.5 A.F.S. $\pm$3%
CYCLE:	1:1:1:1 on:off:reverse:off
PULSE DURATIONS:	1, 2, 4 seconds
OPERATING TEMPERATURE:	-30°C to +55°C

CALCULATIONS FOR INDUCED POLARIZATION

Measurements on Receiver

M = Chargeability (channel 1)-measurement plotted (microseconds)

N = Chargeability (channel 2 - microseconds)

Vp = Voltage (volts)

K = Array Coefficient (dependent on array used) - for 200 m x 200 m square array K = 217.5

I = Current (amps)

Sp = Self Potential Gradient (microvolts)

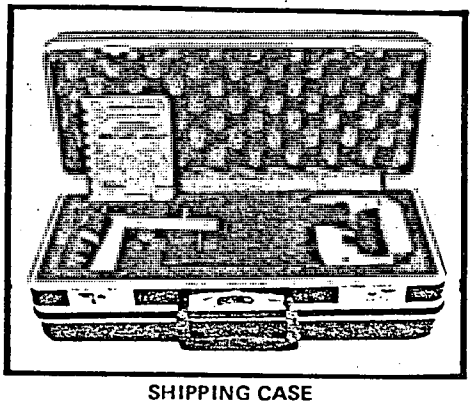
$$\text{Resistivity} = Vp \times \frac{K}{I}$$

CRONE RADEM EM INSTRUMENT SPECIFICATIONS

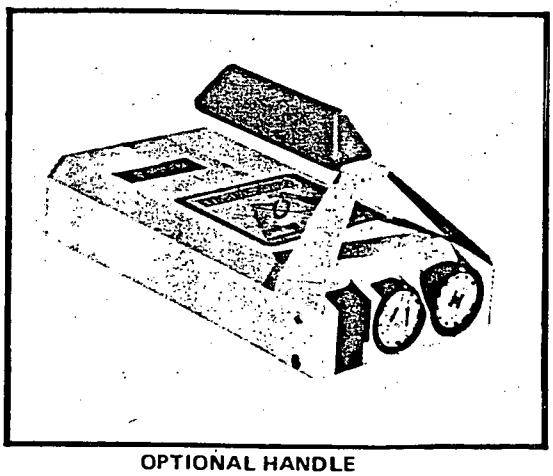
Source of Primary Field:	VLF Communication Stations 12 to 24 KHz
Number of Stations:	7 switch selectable
Stations Available:	The seven standard stations are Cutler, Maine, 17.8; Seattle, Washington, 18.6; Collins, Colorado, 20.0; Annapolic, Md, 21.4; Panama, 24.0; Hawaii, 23-4; England, 16.0. Alternative stations which may be substituted are: Gorki, Russia, 17.1; Japan, 17.4; England, 19.6; Australia, NWC, 22.3 KHz.
Check that Station is Transmitting:	Audible signal from speaker.
Parameters Measured and Means:	1. DIP ANGLE in degrees, from the horizontal of the magnetic component of the VLF field. Detected by minimum on the field strength meter and read from an inclinometer with a range of $\pm 80^{o}$ and an accuracy of $\pm \frac{1}{2}^{o}$.
	2. Field Strength (total or horizontal component) of the magnetic component of the VLF field. Measured as a percent of normal field strength established at a base station. Accuracy $\pm 2\%$ dependent on signal. Meter has two ranges: 0-300% and 0-600%. Switch for "keyed" or "F.S." (steady) signal.
	3. Out of Phase component of the magnetic field, perpendicular in direction to the resultant field, measured without sign, as a percent of normal field strength. This is the minimum reading of the Field Strength meter obtained when measuring the dip angle. Accuracy $\pm 2\%$.
Operating Temperature Range:	-20^{o} to $+110^{o}$F.

THE URTEC MODEL UG-130 "MINISCINT"

FIELD OPERATION



SHIPPING CASE

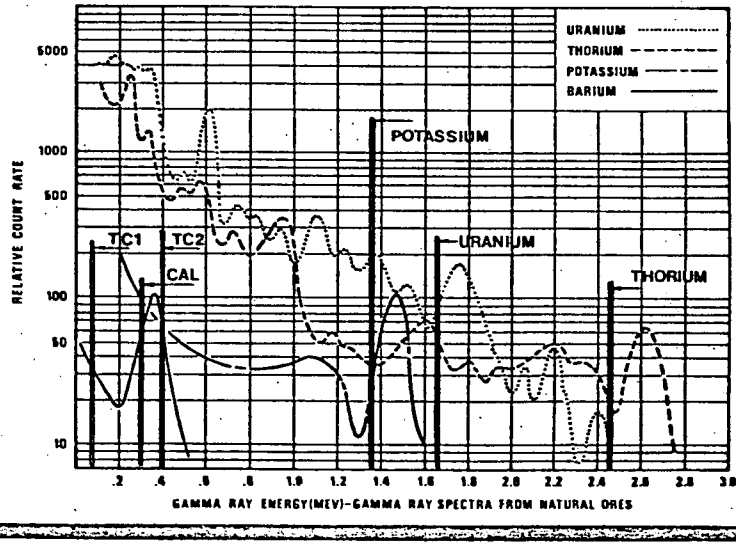


OPTIONAL HANDLE SUPPLIED

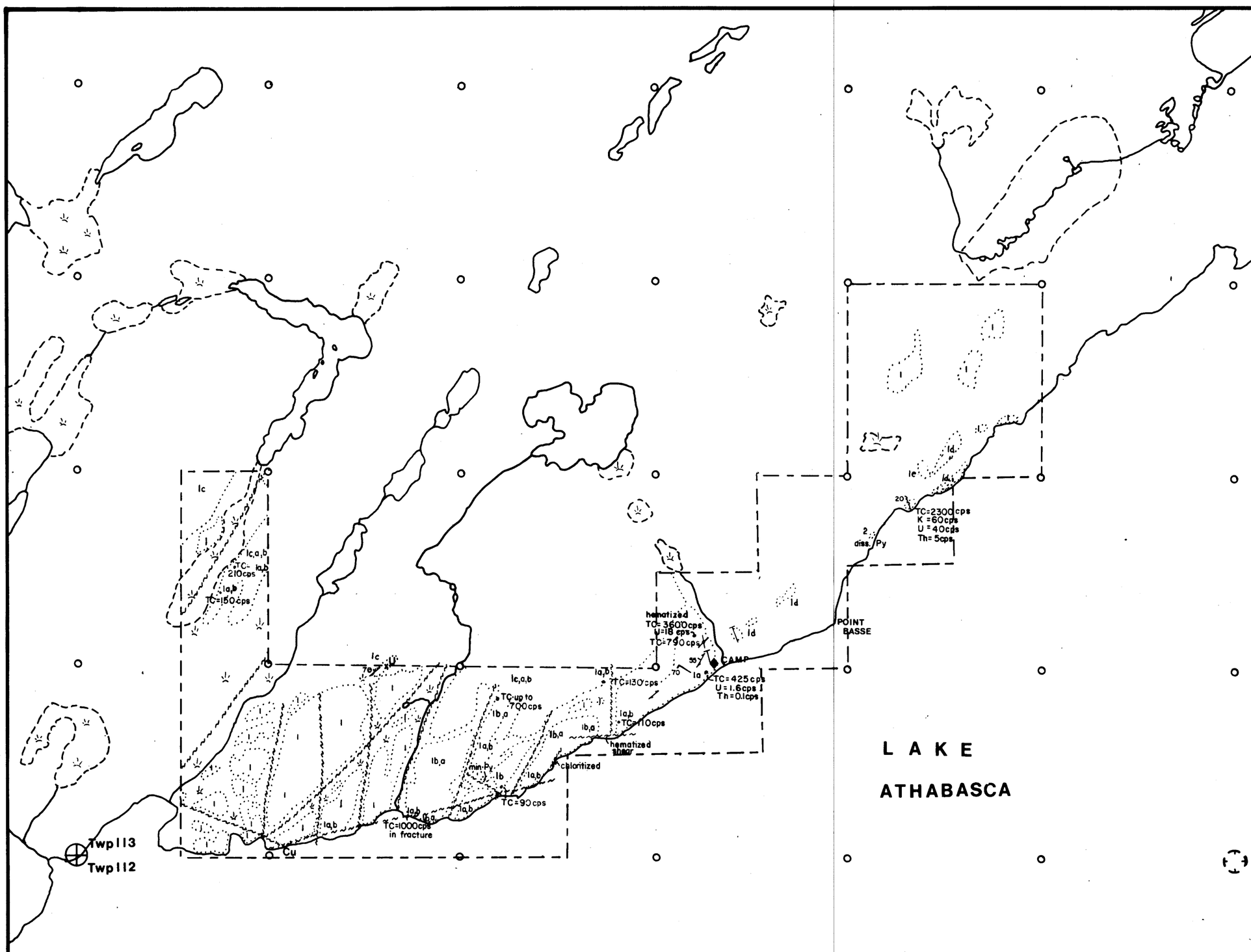
SPECIFICATIONS: SCINTILLOMETER, URTEC MODEL UG-130

Selectable Energy Levels	– Calibration – All energy above 0.30 MEV – Total Count I – All energy above 0.08 MEV – Total Count II – All energy above 0.40 MEV – Potassium – All energy above 1.36 MEV – Uranium – All energy above 1.66 MEV – Thorium – All energy above 2.46 MEV
Detector	– NaI (Tl) crystal, volume 4.0 cu. inches (66 c.c.) mechanically ruggedized.
Spectral Shift as a function of count rate	– 3% or less from -0- to 15000 CPS
Energy Response Linearity error	– less than 2%
Visual Display	– Ruggedized five digit liquid crystal display
Display Overflow	– When counts exceeds 99999, two dots will indicate count rate overflow
Sample Rate	– 1.0 or 10.0 seconds continuous, for all energy levels
Power	– Three "C" size alkaline batteries provide 40 hours normal operation
Battery Test Monitor	– Battery test status can be monitored. When batteries are nearly discharged, keyed audio alarm is activated, overriding count rate audio.
Audio	– The count rate may be monitored in either the continuous mode or selectable count rate threshold mode.
Audio Time Response	– 0.5 seconds from 0 to 2500 CPS
Temperature Range	– Minus 25°C to plus 60°C.
Dimensions & Weight	– 21 cm (8.3 in.) long 11 cm (4.2 in.) wide, 5. cm (2.0 in.) high weight 1.5 kg – (3.31 lbs) includes batteries and handle
Rate Meter Output (optional)	– 100 mV/100 CPS, available through a miniature connector
Calibration	– Switch selectable using self contained Ba 133 ISOTOPE.

SCINTILLOMETER, URTEC, MODEL UG-130, MINISCINT



urtec LIMITED
129 TELSON ROAD, MARKHAM, TORONTO, ONTARIO, CANADA, L3R 1E4
TELEX: 06-986-677
TEL: (416) 495-0660



LEGEND

ARCHEAN

- 2 METASEDIMENTS: interbedded, metaquartzite, and meta-argillite, minor disseminated pyrite less than 1%
- Ie BIOTITE GNEISS: well banded, medium to coarse grained, locally porphyroblastic.
- Id FOLIATED DIORITE/QUARTZ DIORITE: lenses of pegmatitic material, commonly cut by quartz veins and aplite dykes, zenoliths of metasediments.
- Ic QUARTZ MONZONITE: locally well foliated, medium to coarse grained, locally with pegmatitic and aplitic zones.
- Ib CHLORITE GNEISS: feldspar and quartz porphyroblasts, very well banded, less than or equal to 1% biotite.
- Ia GRANITE GNEISS: pink feldspar quartz chlorite with or without biotite gneiss, locally with sulphides.
- I UNDIFFERENTIATED GRANITES & GNEISSES: with or without quartz veins, pegmatitic dykes or veins, parallel to or cross-cutting the foliation, with or without biotitic rich mafic bands.

SYMBOLS

- Outcrop Boundary
- Shear, Fault
- Foliation (dip unknown, known)
- Joint, Fracture (dip known, unknown, vertical)
- Mineral Occurrence, U (Uranium), Cu (Copper), Py (Pyrite)
- Radiometric Reading: TC = Total Count (in counts per sec.); K = Potassium (cps); U = Uranium (cps); Th = Thorium (cps)

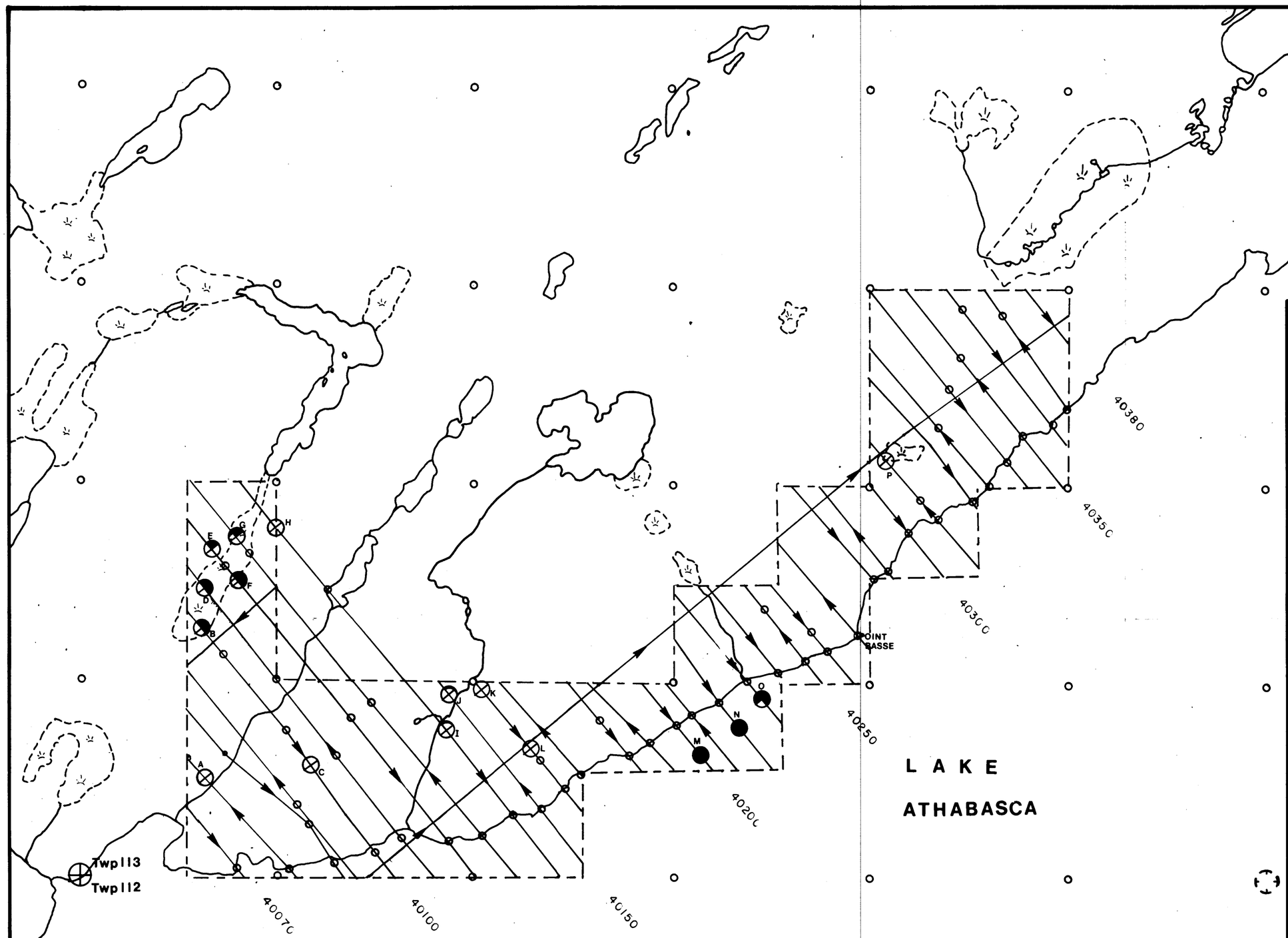
ID 19800003
4-AF-164(1)
#3

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

PERMIT 6879030003
Twp 113 R6 W4M

DETAILED GEOLOGY

MAP	DATE	BY	SCALE	N.T.S.
Figure 3	March 1980	G.I.W.	1:25000	74-L-15



LEGEND

- Permit bondary
- Flight line
- 2 channel anomaly
- 3 " "
- 4 " "
- 5 " "
- 6 " "

SCALE 1:25,000

0 .5 1 1.5

0 .5 1 1.5 2

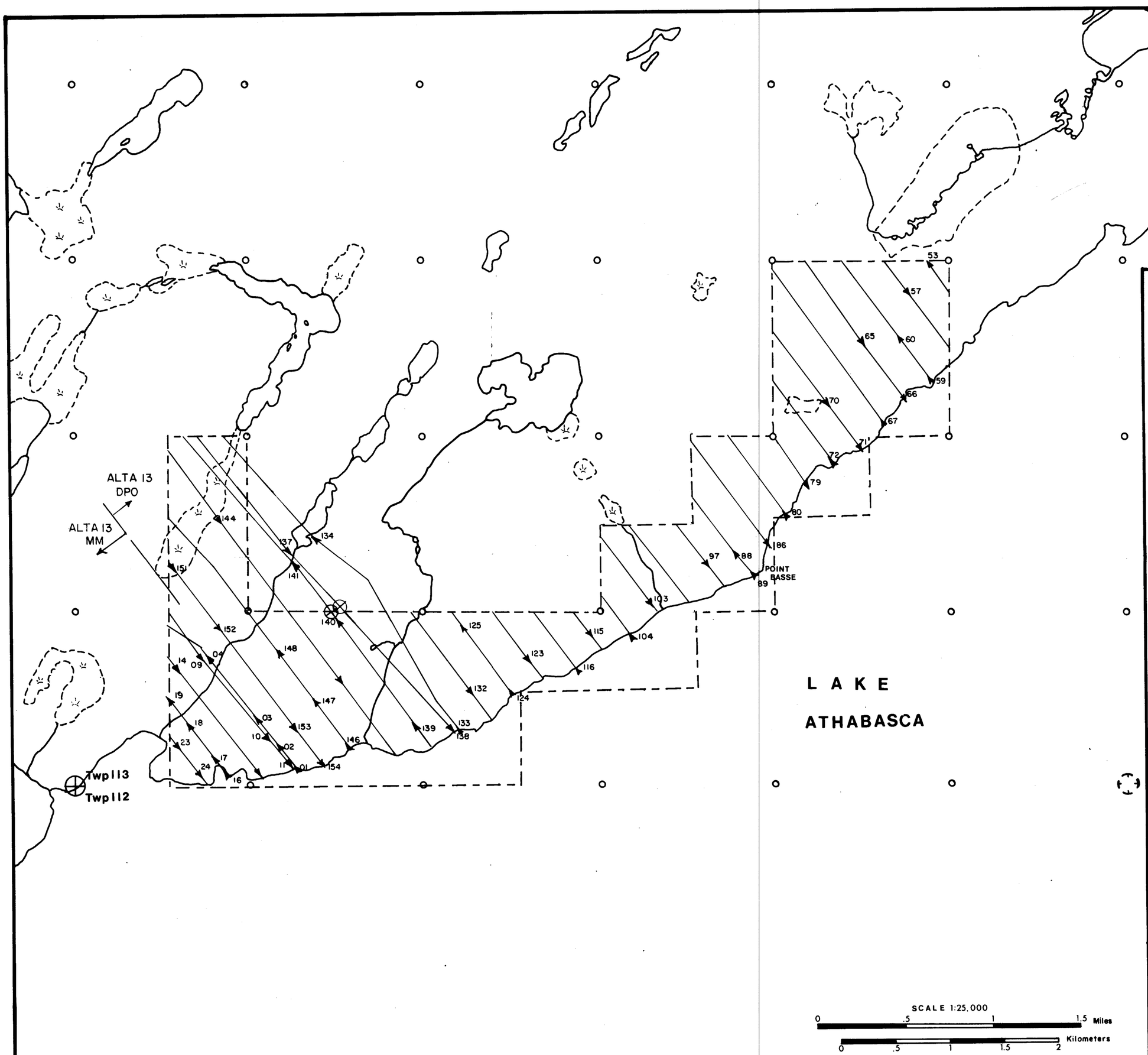
ID1980 0003
U-AF-164(1)
#4

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

PERMIT 6879030003
Twp 113 R6 W4M

AIRBORNE EM & MAG (INPUT)

MAP	DATE	BY	SCALE	N.T.S.
FIG 4	02-80	D J S	1:25 000	74-L-15



LEGEND

- FLIGHT LINE WITH FIDUCIAL AND FLIGHT DIRECTION
- ALTA 13 / DPO / MM — FLIGHT NUMBER; OPERATOR: DAN OLSON, MELVIN MOLTZAN
- ⊕ ANOMALY (Followed up in 1979)
- PROPERTY BOUNDARY

SCALE 1:25,000

0 .5 1 1.5 Miles

0 .5 1 1.5 2 Kilometers

ID 19800003
U-AF-164 (a)
#5

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

PERMIT 6879030003
Twp 113 R6 W4M

AIRBORNE GAMMA SPECTROMETRY

MAP	DATE	BY	SCALE	N.T.S.
Figure 5	March 1980	G.I.W.	1:25000	74-L-15

RANDOM FID: 137
SCANS:RF TO START: 20
SCANS SUMMED: 3

SF	TT	K	U	TH
4455	04466	00075	00066	00066
4456	06254	00147	00109	00074
4457	03793	00085	00054	00037

SF 4455 4457

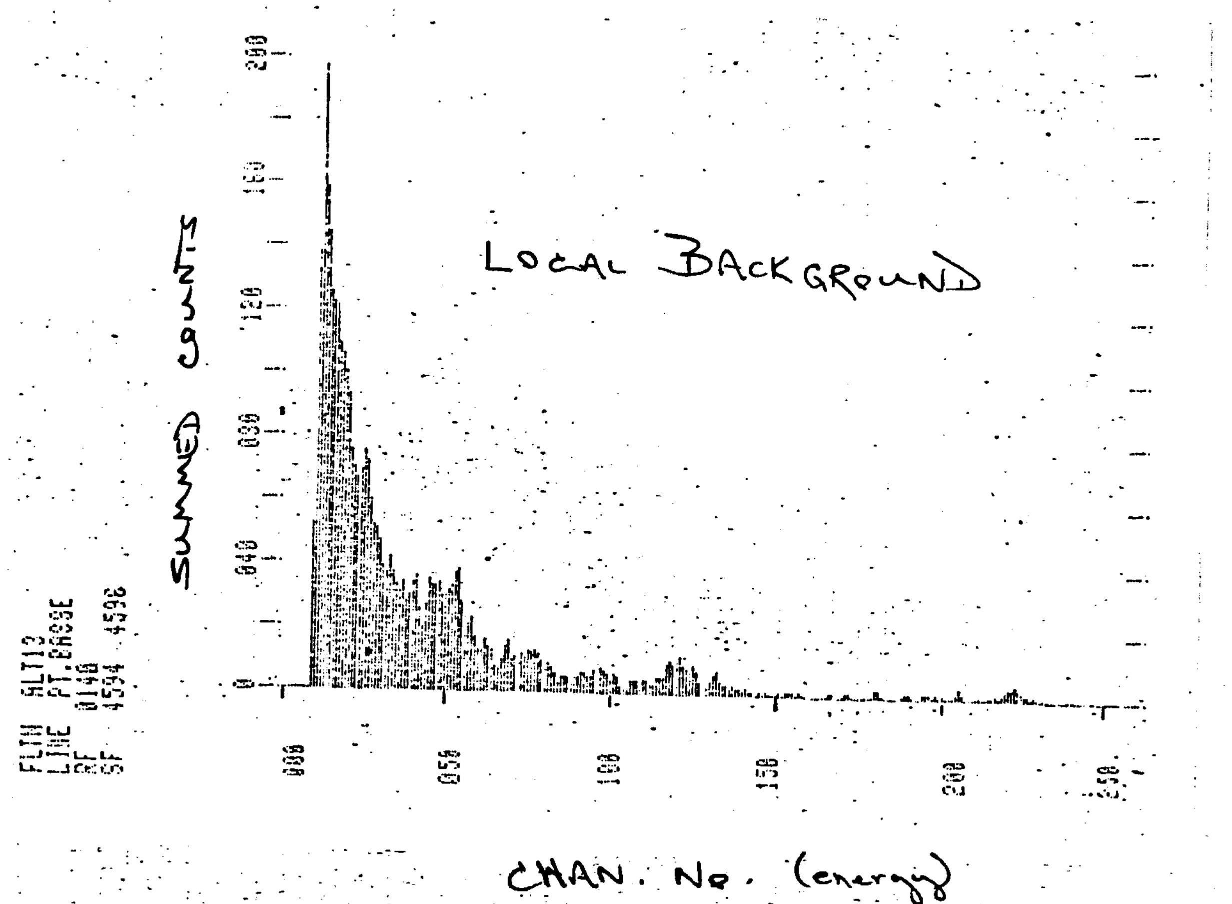
TT	K	U	TH
14513	00307	00229	00177

← TOTAL ACCUMULATED COUNTS

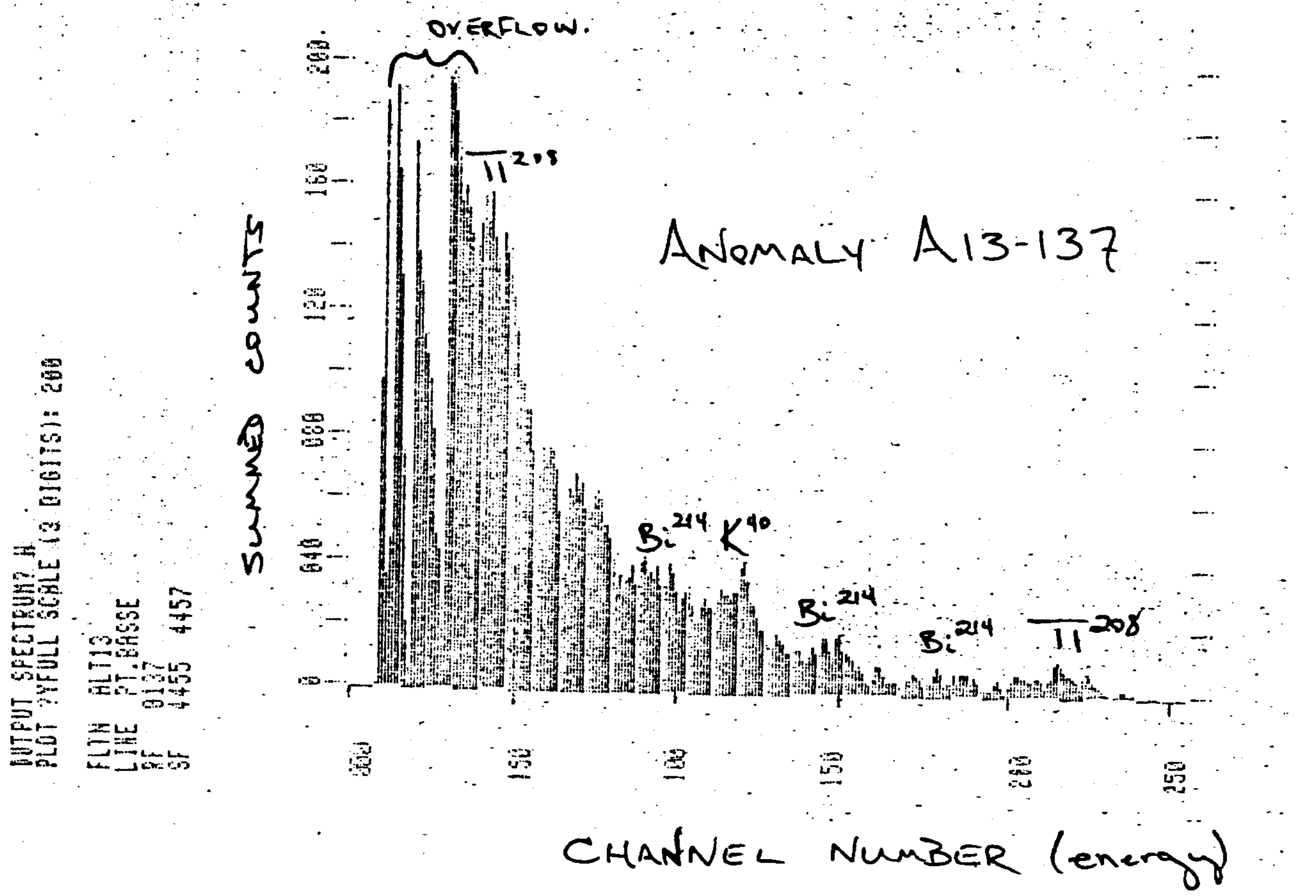
OUTPUT SPECTRUM? Y

010	00412	011	00595
012	00579	013	00546
014	00502	015	00504
016	00431	017	00376
018	00378	019	00355
020	00291	021	00310
022	00301	023	00248
024	00307	025	00244
026	00221	027	00236
028	00202	029	00182
030	00166	031	00135
032	00148	033	00150
034	00141	035	00150
036	00127	037	00129
038	00129	039	00137
040	00144	041	00142
042	00122	043	00162
044	00097	045	00130
046	00121	047	00141
048	00117	049	00129
050	00097	051	00098
052	00084	053	00089
054	00075	055	00081
056	00057	057	00074
058	00068	059	00070
060	00067	061	00076
062	00063	063	00054
064	00051	065	00059
066	00051	067	00070
068	00051	069	00072
070	00054	071	00057
072	00055	073	00055
074	00054	075	00064
076	00055	077	00050
078	00048	079	00050
080	00036	081	00034
082	00031	083	00040
084	00024	085	00041
086	00035	087	00033
088	00032	089	00040
090	00041	091	00037
092	00031	093	00042
094	00030	095	00040
096	00026	097	00032
098	00040	099	00036
100	00026	101	00029
102	00021	103	00037
104	00027	105	00031
106	00023	107	00019
108	00030	109	00030
110	00024	111	00026
112	00030	113	00030
114	00028	115	00035
116	00025	117	00031
118	00030	119	00030
120	00036	121	00044
122	00032	123	00026
124	00030	125	00022
126	00018	127	00021
128	00019	129	00012
130	00013	131	00015
132	00020	133	00014
134	00014	135	00014
136	00013	137	00014
138	00013	139	00012
140	00008	141	00011
142	00016	143	00012
144	00011	145	00017
146	00020	147	00010
148	00012	149	00018
150	00018	151	00013
152	00011	153	00018
154	00006	155	00011
156	00007	157	00007
158	00005	159	00001
160	00008	161	00009
162	00009	163	00005
164	00004	165	00004
166	00005	167	00003
168	00005	169	00004
170	00006	171	00008
172	00005	173	00011
174	00003	175	00004
176	00007	177	00004
178	00009	179	00010
180	00006	181	00006
182	00002	183	00008
184	00005	185	00006
186	00003	187	00012
188	00003	189	00006
190	00006	191	00005
192	00002	193	00004
194	00004	195	00001
196	00006	197	00006
198	00003	199	00004
200	00001	201	00006
202	00007	203	00006
204	00007	205	00005
206	00005	207	00005
208	00005	209	00008
210	00003	211	00004
212	00005	213	00006
214	00007	215	00014
216	00007	217	00010
218	00003	219	00006
220	00009	221	00004
222	00006	223	00005
224	00009	225	00007
226	00004	227	00005
228	00002	229	00002
230	00002	231	00000
232	00001	233	00001
234	00000	235	00002
236	00003	237	00000
238	00000	239	00002
240	00000	241	00000
242	00000	243	00002
244	00000	245	00003
246	00000	247	00000
248	00001	249	00000
250	00000	251	00000
252	00000	253	00000
254	00000	255	00001

PLOT ?YFULL SCALE (2 DIGITS): 050



OUTPUT SPECTRUM? H
PLOT ?YFULL SCALE (3 DIGITS): 200



ID 19800003
U-AF-164(1)
#7

FIG 7

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

AGS
GPU DATA OUTPUT
LOCATION A13-137

MAP	DATE	BY	SCALE	NTS
		MRM		

RANDOM FID: 143
SCANS:RF TO START: 2
SCANS SUMMED: 3

SF	TT	K	U	TH
4579	02375	00052	00034	00024
4580	03514	00118	00092	00028
4581	03278	00094	00068	00030

SF 4579 4581

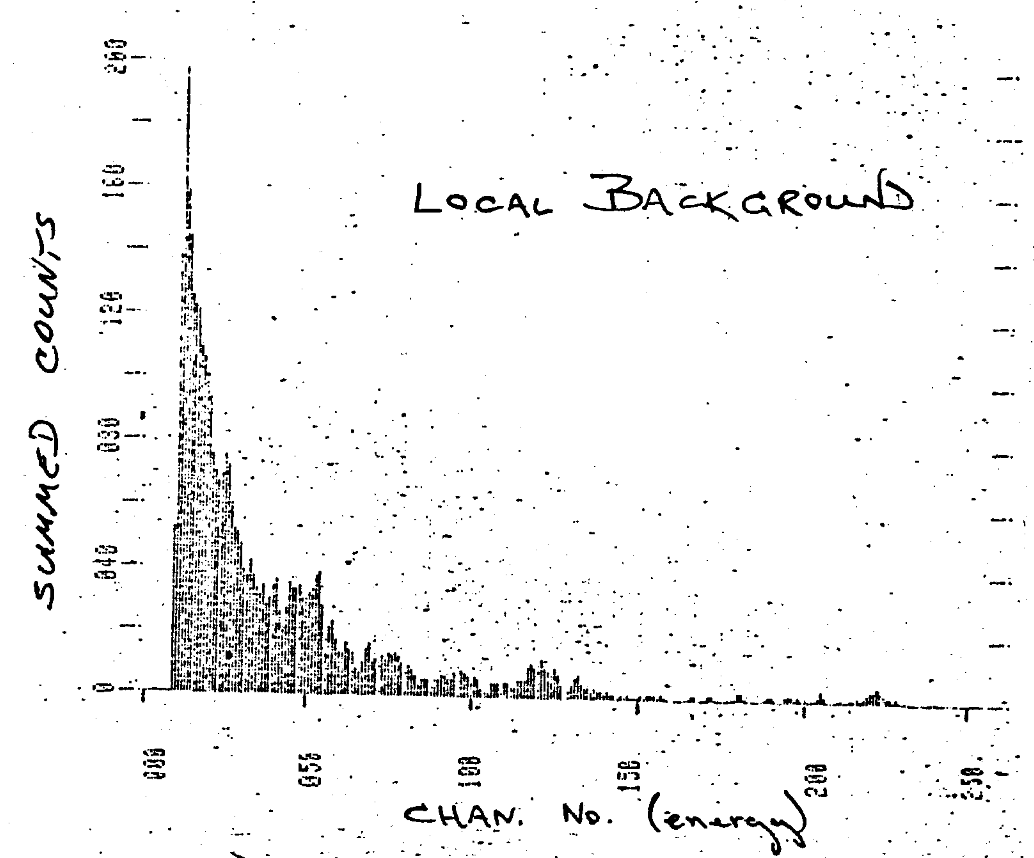
TT	K	U	TH
09467	00264	00194	00082

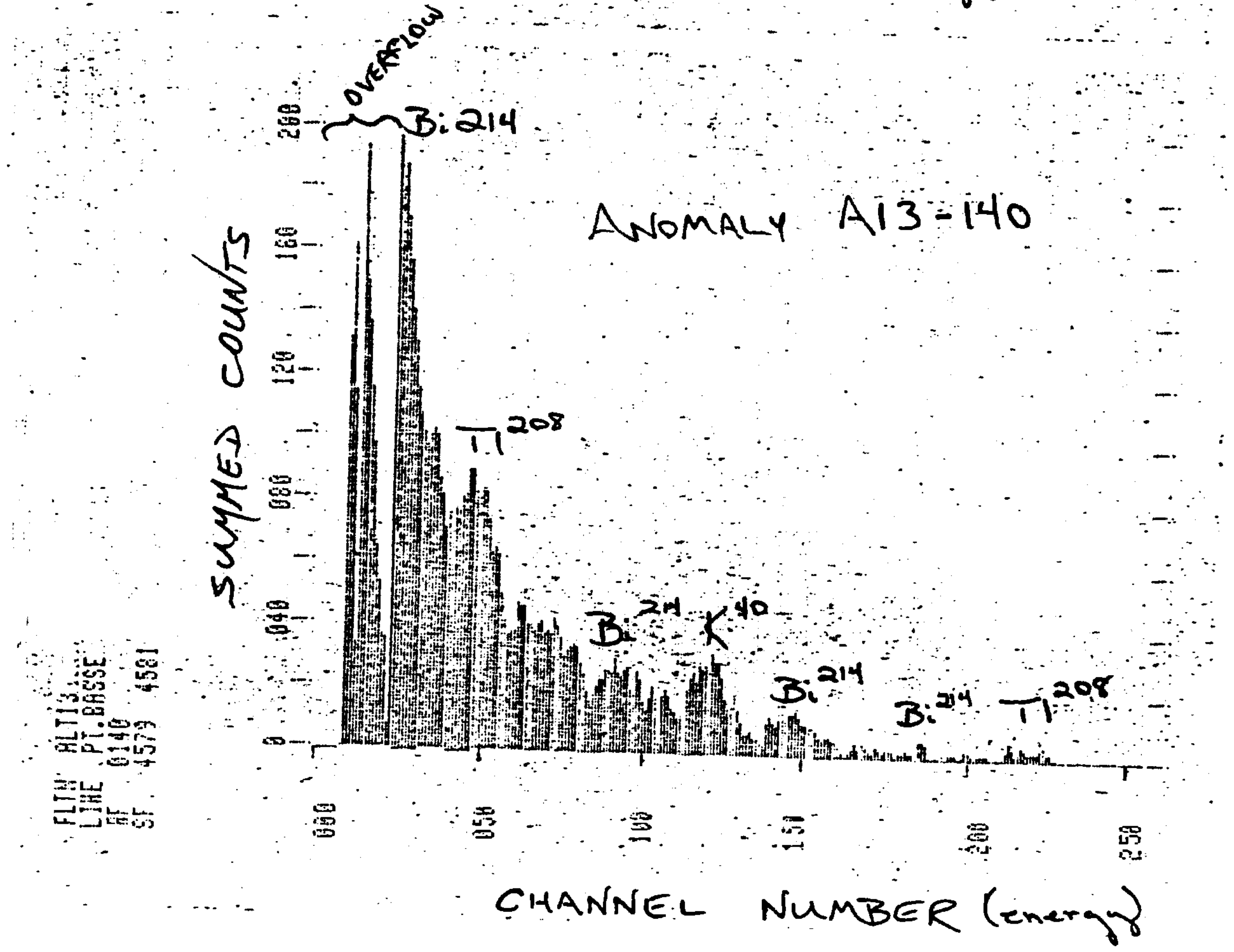
← TOTAL ACCUMULATED COUNTS

OUTPUT SPECTRUM? Y

010	00459	011	00418
012	00411	013	00354
014	00321	015	00303
016	00302	017	00257
018	00259	019	00217
020	00229	021	00207
022	00203	023	00165
024	00182	025	00164
026	00166	027	00140
028	00130	029	00124
030	00107	031	00095
032	00102	033	00084
034	00092	035	00102
036	00083	037	00091
038	00065	039	00074
040	00062	041	00078
042	00058	043	00083
044	00071	045	00074
046	00089	047	00081
048	00076	049	00072
050	00078	051	00078
052	00068	053	00057
054	00058	055	00063
056	00046	057	00034
058	00042	059	00031
060	00038	061	00043
062	00049	063	00037
064	00045	065	00032
066	00036	067	00041
068	00034	069	00041
070	00031	071	00038
072	00038	073	00039
074	00032	075	00031
076	00027	077	00035
078	00031	079	00030
080	00031	081	00019
082	00024	083	00014
084	00015	085	00028
086	00016	087	00025
088	00026	089	00023
090	00027	091	00024
092	00033	093	00014
094	00029	095	00029
096	00015	097	00021
098	00024	099	00025
100	00014	101	00013
102	00018	103	00019
104	00020	105	00012
106	00019	107	00021
108	00016	109	00015
110	00013	111	00012
112	00018	113	00017
114	00015	115	00028
116	00022	117	00023
118	00025	119	00031
120	00021	121	00032
122	00028	123	00030
124	00026	125	00026
126	00015	127	00012
128	00018	129	00014
130	00019	131	00003
132	00005	133	00009
134	00006	135	00007
136	00006	137	00005
138	00004	139	00003
140	00010	141	00007
142	00009	143	00014
144	00009	145	00015
146	00011	147	00014
148	00014	149	00012
150	00010	151	00010
152	00011	153	00011
154	00009	155	00007
156	00006	157	00006
158	00008	159	00005
160	00006	161	00005
162	00001	163	00001
164	00000	165	00006
166	00003	167	00005
168	00002	169	00007
170	00001	171	00003
172	00004	173	00003
174	00003	175	00001
176	00005	177	00002
178	00002	179	00002
180	00002	181	00003
182	00003	183	00001
184	00003	185	00004
186	00009	187	00003
188	00002	189	00001
190	00000	191	00003
192	00001	193	00002
194	00000	195	00004
196	00001	197	00001
198	00001	199	00003
200	00004	201	00001
202	00003	203	00001
204	00002	205	00003
206	00002	207	00002
208	00001	209	00002
210	00001	211	00002
212	00005	213	00005
214	00005	215	00002
216	00002	217	00007
218	00004	219	00001
220	00005	221	00002
222	00002	223	00006
224	00004	225	00005
226	00001	227	00003
228	00001	229	00001
230	00000	231	00001
232	00001	233	00000
234	00001	235	00001
236	00001	237	00000
238	00001	239	00001
240	00000	241	00001
242	00000	243	00000
244	00000	245	00000
246	00000	247	00001
248	00000	249	00000
250	00000	251	00001
252	00000	253	00000
254	00001	255	00000

PLOT ?YFULL SCALE (3 DIGITS): 050





ID 19800003
U-AF-164(1)
#8

FIG 8

Hudbay Uranium Company
A Division of Hudson's Bay Oil and Gas Company Limited

AGS
GPU DATA OUTPUT
LOCATION A13-140

MAP	DATE	BY	SCALE	NTS
		M R M		