CANEX PLACER LIMITED

EXPLORATION DIVISION

6497

REPORT ON

AIRBORNE GEOPHYSICAL SURVEY

CX and FOX Claims

ATLIN MINING DISTRICT, B.C.

N.T.S. 104-N-10

J. M. Thornton
September 15, 1977

BURRARD BUILDING • 1030 WEST GEORGIA STREET • VANCOUVER, B.C., CANADA V6E 3A8 • (604) 682-7082

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INTRODUCTION

Canex Placer Limited optioned the CX and FOX claims from the Logtung Syndicate in May, 1977 and in late July 1977 conducted an airborne radiometric and magnetic survey of the area in order to further test the Trout Lake graben for uranium mineralization.

Approximately 1,000 km. of line were flown, of which 900 km. were recovered.

Several anomalies were detected, most within the area of already found mineralization; extensions of the zone of mineralization on the M.U.G. Syndicate ground located west of Trout Lake along the west boundary fault of the graben.

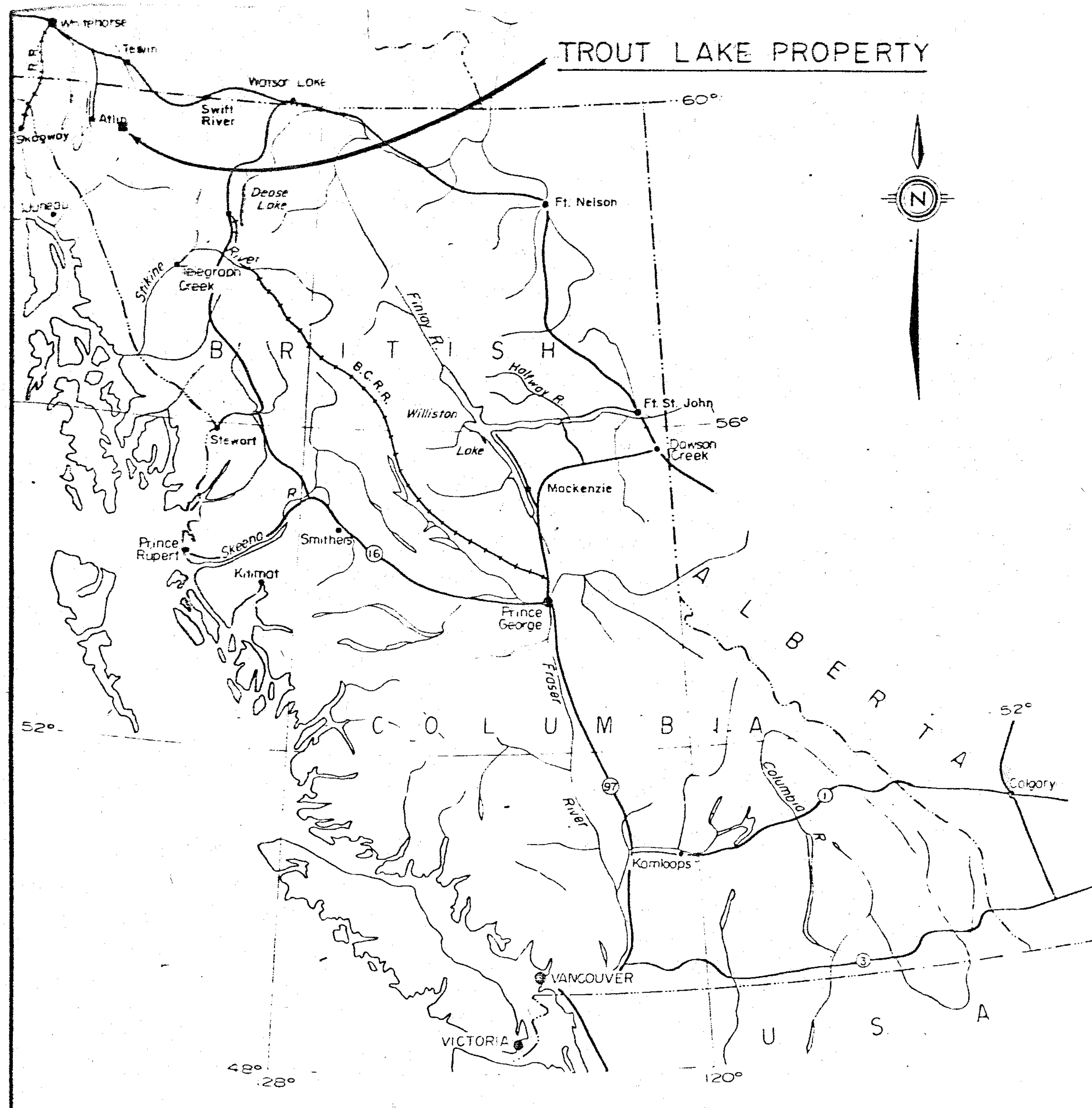
SUMMARY

Approximately 900 line-km. of data were recovered from lines flown at a terrain clearance of 100 meters. Mean line spacing was 200 meters for the north part of the survey and 400 meters for the remainder. Flight speed was 80 - 110 km/hr., commensurate with good radiometric data.

The survey was based in Teslin where accommodation, fuel and an airport were readily available.

An eight channel lightbeam oscillograph (recorder) was employed to record data from a proton magnetometer, differential spectrometer, altimeter and fiducial counter. This data was also recorded digitally on a 200 bpi 7 track recorder. A closed circuit TV system was used for flight path recovery.

Prior to the survey, a photomosaic of B.C. government airphotos (1"=½ mi.) was made and enlarged to 1:10,000 scale. Flight strips were prepared. This photomosaic was to be used for data compilation. However, topographic relief in the area was severe, causing unmanageable distortion in the photomosaic, enough in fact to require flying the area using a 1:25,000 enlargement of the 4 mile geology plan (Aitken, 1953) and flying parallel to the topography in order to maintain realistic terrain clearance.



CANEX PLACER LIMITED

LOCATION MAP

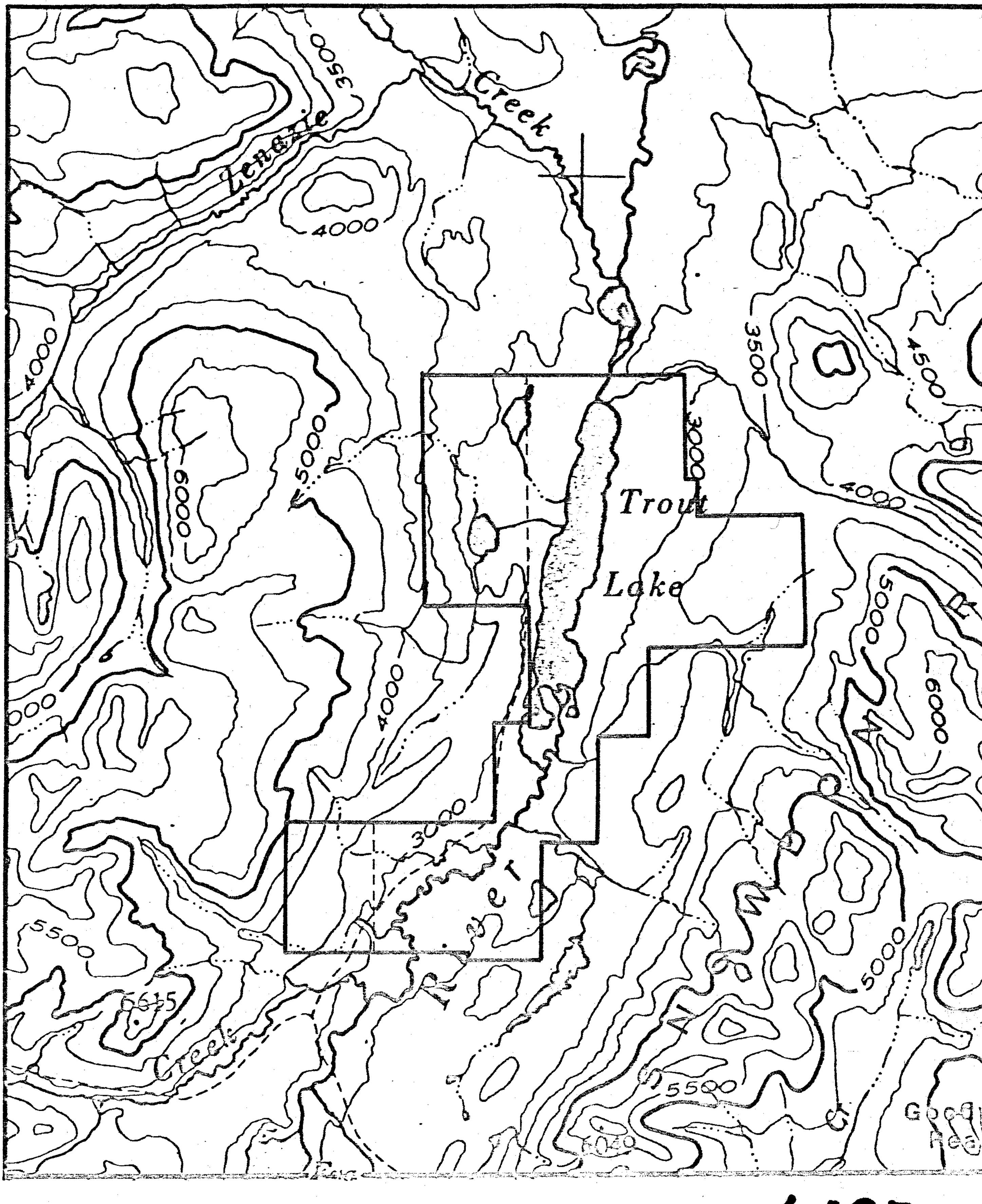
TROUT LAKE PROPERTY

SCALE

MILES 300 150 0 300 600 900 MILES

AUG., 1977. V - 157 J.M.T.

6497



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TROUT LAKE, B.C. NTS 104-N10

LOCATION MAP

CX AND FOX CLAIMS

SCALE 1:100 000

CLAIMS

There are 208 units in the 3 CX and 8 Fox claims, as listed below:

CLAIM	LOCATOR	UNITS	TAG NO.	RECORD NO.	ANNIVERSARY DATE
CX	O.S. Harsine	20	11183	107	1 September 1977
CX 1	"	20	11184	108	1 September 1977
CX 2	"	20	11185	109	1 September 1977
FOX	O.S. Harsine	20	11189	114	17 September 1977
FOX 1	"	15	11190	115	17 September 1977
FOX 2	"	20	11191	116	17 September 1977
FOX 3	"	20	11192	117	17 September 1977
FOX 4	G. Didier	20	11193	118	17 September 1977
FOX 5	O.S. Harsine	18	11194	119	17 September 1977
FOX 6	"	20	11195	120	17 September 1977
FOX 7	"	15	11196	121	17 September 1977
		208			

LOCATION AND ACCESS

The claims lie in and around the Trout Lake Valley at an elevation of approximately 1,000 meters, some 50 km. East of Atlin, B.C. and south of Teslin, Y.T., specifically at 132°45'W, 59°40'N.

Access to the property is primarily via float plane to Trout Lake and thence by boat up or down Gladys River. Access by helicopter is generally poor since the buck brush is high and the beaver have been active in the valley proper.

PREVIOUS WORK

These claims are new, staked to cover areas of uranium mineralization and potential uranium ground discovered by Cordilleran Engineering who conducted a regional exploration program for a group of investors.

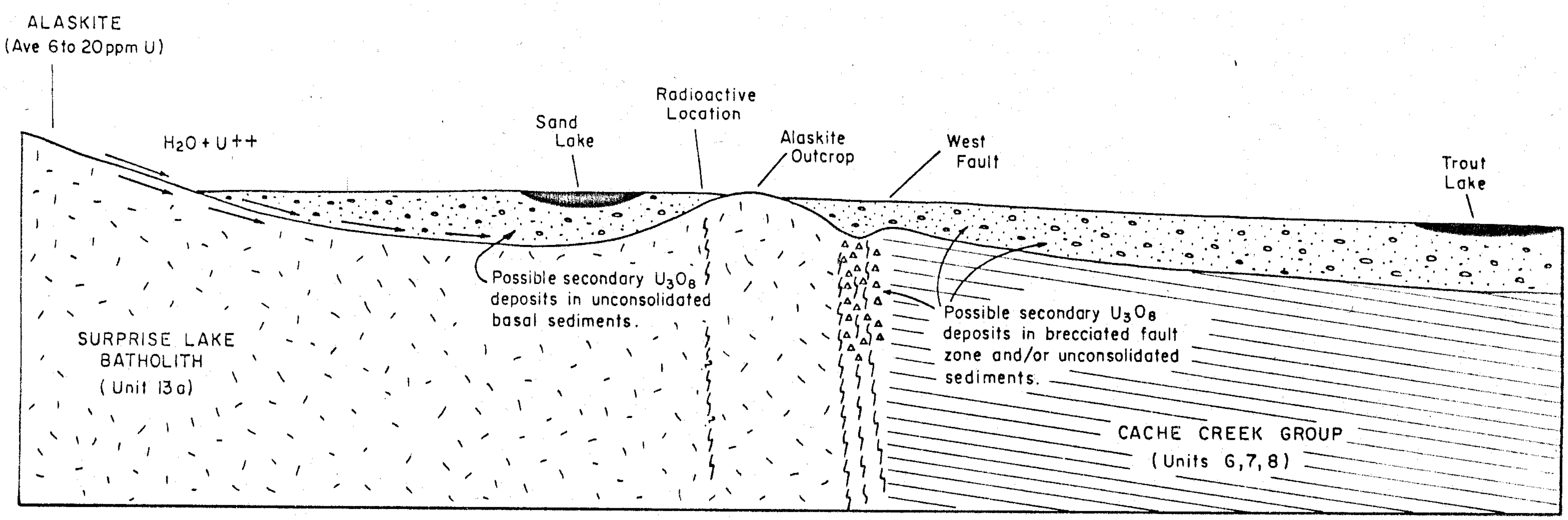
This program consisted mainly of geochemical analyses of stream sediment samples and limited ground followup with a hand-held spectrometer. Encouraging results led to staking of the 11 claims and suggested that an airborne survey might locate better areas of mineralization.

GEOLOGY

The Trout Lake area contains a sedimentary succession of argillites, cherts, carbonates and volcanics of the Cache Creek group. These have been intruded by the Surprise Lake batholith (alaskite) which forms the source material for uranium mineralization in the graben making up the Gladys

DIAGRAMMATIC SECTION

WEST SIDE OF TROUT LAKE GRABEN
(LOOKING NORTH)



NOT TO SCALE

after C.M. Hamilton
Cordilleran Engineering

River basin.

Recent sediments cover most of the graben, possibly concealing unconsolidated sediments which would be the ideal host for secondary uranium mineralization.

EQUIPMENT

The survey was performed with a Bell 206B helicopter fitted with a total field magnetometer, 4-channel gamma ray spectrometer, radar altimeter recorders and other support hardware.

Data was recorded on an 8-channel lightbeam oscillograph and also in a 48 character digital "word" on a Kennedy tape recorder once every 1.14 seconds.

The magnetic data was gathered by a "bird" flown 20 meters below the aircraft resulting in a 70 meter nominal flight height for the magnetometer and 90 meters for the radiometric survey where the 3.2 liter crystal (8" dia. x 4" high) resided in the helicopter baggage compartment.

Flight path was monitored with a TV camera and recorder.

Appendix B contains a list of the equipment and details and specifications.

OPERATING PROCEDURE

A mosaic of aerial photographs was produced before the commencement of the survey. On this plan, flight lines were plotted and numbered. Several copies of this flight information were made and cut into overlapping strips 40 cm. wide.

Flight strip scale was 1:10,000 and wide enough in order to include enough information on either side of the flight lines for location purposes.

A pilot, navigator and equipment operator were employed in the performance of the survey, the equipment operator being ground-based.

The navigator's duties were to direct the pilot along the predetermined flight lines. Flight control was established by the navigator by picking reference points on the ground and marking them on the prepared flight strips. Each point on the flight strips was accompanied by a fiducial number generated by a foot-operated button, which incremented a counter and also produced a fiducial mark on the analogue data record. Therefore, fiducials on the record correspond to locations on the ground and on the navigator's flight line strips.

The ground based equipment operator ensured that the spectrometer was in calibration daily and monitored the magnetic field in Teslin.

After each flight, the records were examined for errors, correct equipment operation and anomalous zones, with the next flight planned on the basis of this examination.

Equipment troubles necessitated compilation of the data by hand rather than by utilizing the in-house computer facilities.

TREATMENT OF DATA

The northern section of the surveyed area was flown using a 1:10,000 air photomosaic cut into manageable flight strips. Lines were flown east west at 200 metre spacing. Distortion at the blown-up scale made navigating extremely difficult. It became necessary to abandon that approach and fly with the 1:25,000 scale geology plan using contours and physical features on the rudimentary map for reference.

This plan was of a limited area, being slightly larger than the claim area, and was the only map available. Lines roughly parallel to the topography on approximately 400 metre centres were flown over the valley floor with several excursions up into the mountains both east and west of the "graben". Terrain clearance was more constant flying in this manner as the hills were steep enough to preclude climbing straight up with the helicopter.

Data was recovered from the analogue record and plotted on the air photo flight strips for the northern flight lines and on a copy of the geology map (1:25,000 enlargement).

An attempt to transfer the data from the flight map to the distorted air photo was made in order to generate a series of overlays for the photomosaic. Some points were as much as 600 meters in error on the air photomosaic and some fiducials had been eliminated or covered up in the photofitting process. It was felt that the air photo map was useless. Therefore, another 1:25,000 scale map was generated from the 1:250,000 topographic map (104-N) encompassing the surveyed area. A base map was made from the enlargement and all flight data was transferred to this map and scale. All further recovery was compiled on this map with the result that data in the north-west corner of the surveyed area is very poorly located due to lack of reference points.

A list of radioactive anomlaies is to be found in Appendix A. Background for the four channels was determined as follows:

Channel	Quantity meas.	Bandwidth	CPS Bkg.
Potassium	K-40	1.36 - 1.58 Mcv	23
Uranium	Bi-214	1.63 - 1.89 Mcv	12
Thorium	T1-208	2.45 - 2.79 Mcv	4 to 5
Total Count	1 Mcv	1.00	240

Uranium peaks of 25 counts/sec (2x) and better are noted in the list. Thorium and potassium traces were not analyzed in detail except in areas of uranium activity. Many instances of uranium "kicks" not exceeding 25 cps were noted, but were anomalous in the general area. Most of these are listed as well.

Figure is a portion of the analogue record for flight 7. The photocopy is rather poor due to the grey traces on pink background. Much of the data is readable, but will not copy by any means.

Radiometric data was plotted on the fiducial-flight line overlay of the base map.

A separate map of the magnetometer data was also produced with magnetic data plotted along the flight lines and subsequently contoured at twenty-five gamma intervals. Accuracy of location dictated the magnetometer contour detail.

CONCLUSIONS

The airborne survey revealed zones of high concentrations of uranium which roughly parallel the west fault of the graben. Several isolated uranium peaks were also recorded in the valley away from known areas of mineralization. Weak anomalies were also recorded on the east side of the valley near the eastern boundary fault, but not nearly as strong as on the west.

Flight lines on the hills to the west showed interesting uranium values over the alaskite (Surprise Lake Batholith). This intrusive has an average of 20 ppm Uranium (data obtained from MUG Syndicate and Canadian Johns-Manville from approximately 2 years work in area) thus making it an ideal source of uranium for deposition in the Trout Lake Valley.

In general, the radiometric data indicates the best surface uranium to be situated just downslope of the Western fault of the graben on the MIR 6-7 claims held by the MUG joint venture. Most of the anomalous ground lies outside the Logtung claim area with the anomalies extending into the claim areas of CX and CX 1 to the north and CX2 to the south.

Several weak anomalies were detected along the east fault of the graben within the Fox 6 claim.

The magnetic data indicates that the bulk of the graben fill is non-magnetic. Several bands of magnetic highs roughly parallel the valley semi-continuously from Glady's Lake south to Eva Lake. These highs may represent volcanics in the Cache Creek group rocks making up the basement complex.

One isolated magnetic high between Sand and Trout Lakes suggests a depth to basement of 150 meters beneath the "bird" or approximately 80 meters below the swamp surface.

The strong magnetic peak east of the south end of Trout Lake revealed a depth of burial of 88 meters using the thin dyke model. In each of these anomalies a thin bed (20 to 40 meters) of volcanics (containing approximately 2% magnetite) could cause the measured anomalies. As the flight lines were north-south, dips could only be guessed and appeared to be steep (most probably greater than 50^{o}).

The two faults are revealed as magnetometer lows. The eastern fault splits about the NE corner of Fox 7, one continuing N20E and the other N30W toward Gladys Lake.

RECOMMENDATIONS

Economic uranium mineralization in the Trout Lake graben may be associated with the boundary faults either deposited in unconsolidated sediments or as fracture filling in the fault zones. The west fault gives stronger response than the east side of the valley.

A program of soil geochemistry, magnetometer and VLF surveys (to define the fault zone in the covered area north of Sand Lake), followed by drilling at least one hole should be followed, if geological examination of the best airborne anomaly areas reveals good host conditions for mineralization.

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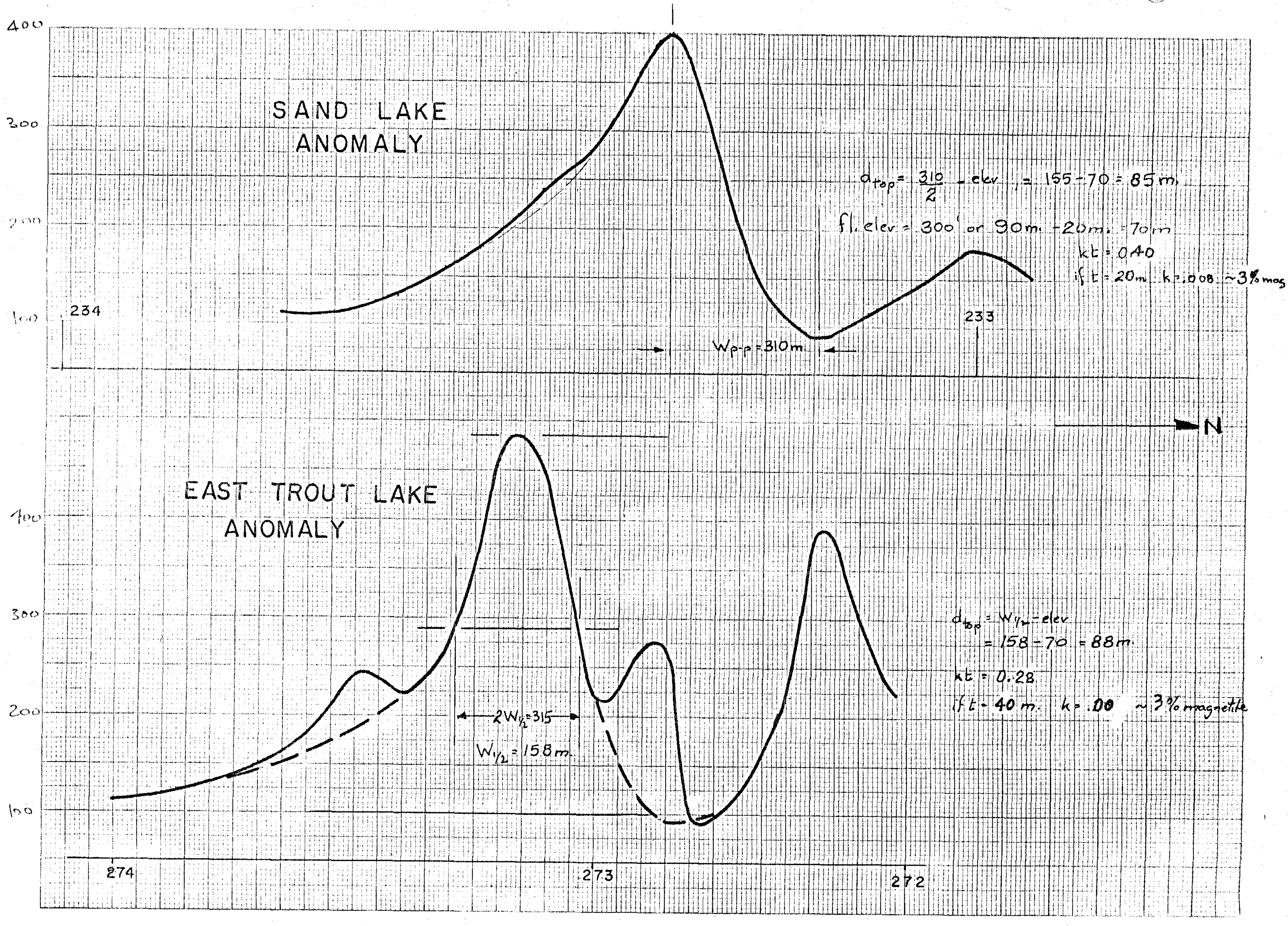

400
300
200
100
SAND LAKE
ANOMALY
234
233
Wp-p = 310m
dtop = 310/2 - elev = 155 - 70 = 85m
fl. elev = 300' or 90m - 20m = 70m
kt = 0.40
if t = 20m k = .008 ~3% mag.
N
EAST TROUT LAKE
ANOMALY
400
300
200
100
2W½ = 315
W½ = 158m
dtop = W½ - elev
= 158 - 70 = 88m
kt = 0.28
if t = 40m. k = .00 ~3% magnetite
274
273
272

The 1200 gamma magnetic anomaly on line 3, west of Gladys Lake, has a half width of 118 meters, with a bird height of 53 meters. The top of the magnetic source is at a depth of 65 meters. A 50 meter thick dyke would have a susceptibility of 0.024 cts units. This corresponds to 8% magnetite, a somewhat high figure for volcanics.

The Surprise Lake Batholith itself (containing an average of 20 ppm U) is an excellent target. Fracture zones in the intrusive might contain economic amounts of mineralization. The area north of Zenazie Creek on the intrusive gave anomalous uranium readings comparable to the rocks west of Trout Lake. The area should also be examined for conditions favourable for secondary uranium deposition.

J. M. Thornton

J. M. Thornton, Geophysicist

September 15, 1977

JMT:jpt

STATEMENT OF QUALIFICATIONS

I, J. M. THORNTON, of 3393 Fairmont Road, in the District of North Vancouver, Province of British Columbia, DO HEREBY STATE:

1. That I have no interest, direct or otherwise, in the affairs of Logtung Resources, nor have I had in the past;
2. That I have been continuously employed by Canex Placer Limited for ten years, working as a geophysical technician and latterly as a geophysicist;
3. That I graduated from the British Columbia Institute of Technology in 1967 in the field of electronics.

DATED at the City of Vancouver, in the Province of British Columbia, this 15th day of September, A. D. 1977.

J. M. Thornton

J. M. Thornton

CERTIFICATION

I, D.C. Rotherham, with a business address at 800 - 1030 West Georgia Street, Vancouver, British Columbia, DO HEREBY CERTIFY THAT:

1. I am a professional engineer registered in the Province of British Columbia;

2. I have examined the report by J.M. Thornton on work done in 1977 on the CX and FOX Claims, 103°45'N 59°40'N, Atlin Mining Division.

3. To the best of my knowledge the acquisition of the data and expenditure claimed for the performance of work is correct.

Respectfully submitted,

D.C. Rotherham P. Eng.

D.C. Rotherham, P. Eng.

Dated this 16th day of September 1977, Vancouver, British Columbia

APPENDIX A

List of Anomalies

Tape 1	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
	1	1.1	14	20	7	240	180	4	
		7.2	14	35	8	280	300	4	2 x loc. bkg.
		9.8	15	40	9	280	300	3	2 x loc. bkg. (good)
		11.3	14	45	12	260	280	4	good weak
		18.0	20	30	10	260	310	4	edge lake 2 x loc. bkg.
		19.6	30	37	12	440	500+	3	very high wk TC
		19.85	31	64	15	500	300	3	series of highs
		22.6	40	52	32	570	150-	2	hi Th v. low
	2	before 1	34	53	16	440	300	3	hi Th & TC
		before 1	35	48	7	450	500+	3	very high variable
		1.7	23	70	20	560	160	3	good TC
		2.7	2	50	42	540	240	4	V. hi Th & TC
		3.3	36	52	22	570	140	2	V. low hi K & Th
		4.8	27	45	31	480	270	3	
		6.0	35	70	30	680	150	3	hi Th & K
		11.3	25	48	12	265	270	3	3 x loc. bkg.
	3	7.2	17	41	8	250	280	4	recognizable
		8.0	20	47	5	220	270	4	1½ x loc. bkg.
		19.9	28	42	22	480	450	3	very high NOTC
		19.95	28	48	18	470	420	3	hi TC all active
		21.4	27	44	23	520	260	3	hi K in area
		21.7	27	62	23	620	280	3	hi K
		22.0	28	60	22	560	350	3	broad hi K
		22.6	29	65	18	500	180	3	hi K low
	4	1.6	28	55	33	530	170	3	lo gnd cl.
		0 - 1	active all channels				altimeter highly variable		
		2.6	32	70	40	650	170	2	
		2.8	28	50	13	460	320	3	
		19.4	20	42	4	250	280	4	2 x loc. bkg.

Tape 1	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
	5	0.7	16	40	3	260	400	4	2 x loc. bkg.
		7.6	14	38	3	250	300	4	broad 2 x bkg.
		15.9	30	65	18	650	150	3	active all ch.
		17.3	33	60	22	575	200	2	
		17.8	34	42	18	470	280	2	sharp good
		18.6	28	41	17	500	500+	3	very high alt.
		23.9	25	46	12	250	400	3	very high, sharp
	6	before 1	26	50	19	630	190	3	very low
		1.7	25	50	23	500	250	3	double peak
		2.3	31	70	25	680	250	2	good peak
		2.5	28	45	25	400	450	3	sharp U
		2.3 to 3.5	all channels active				altimeter variable		
		2.9	32	48	29	490	300	3	good U pk.
		8.4	20	50	12	370	250	4	2 x loc. bkg.
Tape 2	11	10.9	19	32	8	230	360	4	
		10.6	22	40	8	240	220	4	
		6.6	35	52	23	700	180	2	
		6.8	28	55	25	575	230	2	
	10	18.4	29	70	33	575	250	3	
		18.1	33	62	28	615	200	2	good sharp broad
		17.8	27	69	38	590	220	3	
		17.4	22	45	7	305	300	4	edge water
		16.7	21	55	18	496	200	4	
		14.6	27	47	19	504	350	3	
		14.4	34	31	22	490	300	2	
	9	15.1	17	38	11	260	240	4	
		8.0	23	34	8	310	200	3	
		2.7	29	67	31	590	230	3	
		2.5	23	42	17	530	250	3	
		2.2	23	50	10	345	300	3	
		before 0	31	47	12	410		2	very high

Tape 2	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
	8	3.4E	41	50	32	575	220	1	
		2.4E	33	50	30	600	230	2	very sharp peak
		1.6E	28	70	17	480	240	2	
		0.4E	29	51	14	540	200	2	very low
		7.4W	23	41	12	265	310	3	
		1.5W	20	37	8	270	300	2	2½ x loc. bkg.
	7	18.4	17	41	4	225	280	2	2 x loc. bkg.
		11.0	19	42	8	305	240	2	2½ x loc. bkg.
		7.3	32	63	22	608	170	3	all high in area
		2.4	32	48	20	545	280	2	all high in area
		1.7	27	53	20	550	230	2	all high in area
Tape 3	12	before 1	33	62	12	530	300	2	
		2.5	32	68	15	435	240	2	good all in area hi
		4.3	20	41	8	288		3	
		18.3	17	42	5	280	300	2	loc. bkg. 6
		21.4	21	43	5	270	180	2	loc. bkg. 7
		28.0	14	45	6	300	175	4	
	13	37.4	20	33	5	280	320	2	good peak in low bkg.
		38.7	22	30	11	320		2	loc. bkg. 10
		39.3	24	40	5	345	330	3	broad
		40.1	28	38	3	280	very high	3	sharp (No TC)
	14	5.1	33	60	8	500	150	2	very sharp but low
		7.4	37	50	23	570	180	2	hi Th. all in area hi
		7.7	33	48	20	530		2	hi offset in TC poss radon
		11.8	18	42	4	304	360	2	loc bkg. 8; good
		12.7	14	39	4	275	280	3	loc. bkg. 5; good
		14.1	18	32	4	280	230	4	loc. bkg. 7
	15	147.7	19	34	8	290		4	
		148.0	15	37	6	260		4	

Tape 3	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
	15	148.5	15	36	7	260		4	
		149	16	41	8	300		4	
		151.	21	42	8	305	310	3	
		164	32	43	10	488	110	2	2 peaks (all v. hi)
		164.2	28	51	22	580	150	2	getting hi on ridge
		166.4	27	60	22	584	450	2	high TC; hi all
		166.6-7	30	50	24-26	610	250	2	hi all
	16	168.4	27	50	12	430	330	2	2 peaks; good
		168.8	29	45	16	490		2	
		169.0	32	43	12	430		2	
		169.3	26	41	13	340	300	2	all hi in area
		169.8	34	66	33	670	250	2	all hi
		173.0	24	65	22	550	240	2	all active
		176.6	15	41	12	300	310	4	all active U 2 x loc.bkg.
		179.6	21	40	8	300	280	4	over creek
	17	190.0	18	42	5	265	290	4	double peak 2 x loc.bkg.
		191.5	21	38	10	300		3	
		193-194	20-30	60-90	20-40	600			all active
		198	25	50	18	640		3	
	18	199.6	27	41	10	395	700+	2	good peak; v. hi.
		199.9	21	40	6	340	700+	3	good TC peak; v. hi
		201.6	26	60	27	470		3	
		210.6	22	41	6	230	300	4	2 x loc. bkg.
	19	227.7	19	40	4	300	300	4	2 x loc. bkg.
		233.5	31	58	25	575	140	3	
		233.8	35	55	30	650	140	3	all hi in area
	20	248.6	20	41	9	265	300	4	
		255.8	22	48	8	350	310	4	
		258.4	27	52	17	520		4	

Tape 4	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		4.5	27	15	5	256		4	
		5.2	41	18	12	480	270	1	
		5.3	42	28	12	500	260	1	
		5.7	41	24	22	540	270	1	
		6.4	39	51	18	610	310	1	
		6.7	44	30	15	580	270	1	broad
		7.1	40	25	12	520	300	1	2 peaks
		7.7	32	40	10	580	300	3	
		7.85	44	37	17	650	240	1	all hi in area
		8.3	48	30	13	530	270	1	v. strong peak
		8.9	45	22	23	620	280	1	v. strong peak
		9.1	50	24	18	610	300	1	v. strong peak
		9.2	59	32	19	690	310	1	v. strong peak; all hi K 20 -40
		9.3	47	43	21	700	300	1	v. strong peak; U 15-50
		9.45	42	33	21	650	290	1	v. strong peak; Th 8-20
		9.50	40	31	18	570	300	3	v. strong peak; TC 420-700
		9.8	42	23	5	485	320	3	v. strong peak
		10.0′	43	15	17	520	280	3	
		10.9	42	17	11	520	320	1	
		11.1	43	18	12	510	310	1	fairly broad
		18.1	25	15	5	330	350	3	sharp
		18.2	26	18	4	300	330	3	
		18.4	26	20	4	270	300	3	
		19.3	32	22	5	265	300	3	
		25	31	15	12	340		3	
		25.7	37	16	8	380		2	
		28.0	34	35	17	520	280	2	2 peaks on edge of sm. lake
		28.1	40	25	15	560	270	2	broad arrow
		28.3-25	44	28	17	500	300		
		28.4	39	16	7	416	280	2	
		28.45	37	12	10	400	290	2	
		28.52	34	22	5	430	280	2	
		.56	38	15	10	410	280	2	
		.58	40	15	11	460	290	1	

Tape 4	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		28.7	47	23	17	528	280	1	
		.8	42	20	12	415	270	1	
		.9	45	20	17	590	270	1	double peak
		.94	41	22	12	500	290	1	double peak
		30.6	31	16	7	320	290	2	
		.7	27	22	6	330	290	3	
		32.9	31	17	5	290	330	2	
		34.6	28	16	5	265	330	3	
		34.8	29	25	12	345	290	2	
		34.9	34	16	8	350	300	2	
		36.95	25	18	5	345	300	4	
		38.9	27	25	7	340	300	4	
		43.2	34	22	15	410	290	3	
		43.8	27	28	12	430	300	3	
		43.95	33	21	8	390	320	2	
		44.2	29	15	8	320	300	2	double peak
		50.9	30	--	10	370	300	4	
		51.2	26	--	12	340	310	4	
		51.5	25	--	8	300	320	4	double peak
		51.9	28	--	6	320	300	4	
		52.25	34	--	6	360	270	3	good peak; VSM TC
		52.3	29	--	12	300	280	3	
		52.5	25	--	6	330	300	3	double peak
		52.7	34	--	5	410	320	2	
		52.72	41	--	8	380	310	1	
		52.9	33	--	6?	400	300	3	
		54.05	30	--	8	360	300	3	
		54.2	32	--	12	350	280	3	double peak
		54.5	30	--	7	330	260	3	
		54.5	32	--	8	290	330	2	
		4.8	28	--	7	300	350	3	double peak
		5.7	25	--	8	330		3	
		6.2	27	--	6	320	200	4	double peak

Tape 4	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		6.4	23	--	5	290	250	3	2 x loc. bkg.
		6.7	31	--	5	250	310	2	
		6.9	32	--	5	300	390	2	
		57.7	29	--	7	350	140	4	2 x loc. bkg

Note: Potassium channel stopped working on line but appeared to be fine on all subsequent work.

Tape 5		282.3	36	43	12	410	330	2	all hi in area
		282.2	32	38	16	440	320	2	all hi
		274.2	29	15	15	340	290	3	
		273.5	30	26	8	340	270	2	
		265.6	26	18	8	260	250	3	2 x loc. bkg.
		.3	26	22	12	250	330	3	2 x loc. bkg.
		.25	25	30	8	260	300	3	2 x loc. bkg.
		.15	24	20	15	260	280	4	2 x loc. bkg.
		261.4	27	12	12	250	400	3	high alt.
		244.2	24	31	17	352	300	3	active area
		243.5	27	33	15	430	300	2	active area
		237.4	28	15	12	340	230	3	active area
		236.5	32	18	15	370	290	2	active area
		235.9	34	17	17	340	270	2	
		235.75	38	22	18	420	340	1	
		.62	37	33	23	480	260	1	
		.55	34	30	13	390	250	2	
		.40	40	40	24	500	260	1	
		.3	33	40	12	390	320	2	
		.2	28	12	12	350	340	3	
		.15	32	33	16	400	350	2	double peak
		234.2	27	28	10	280	300	3	2 x loc. bkg.
		233.7	28	22	16	300	310	3	2 x loc. bkg. active area
		230.3	24	24	18	260	300	3	2 x loc. bkg. gd TC
		229	51	12	28	575	260	1	exc. sharp (close gnd.)
		228.7-228.8	52	48	28	660	200	1	very active area; mult. pks
		202.3	27	22	12	370	270	2	area high
		202.8	30	30	12	370	300	2	active

Tape 5	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		202.9	27	25	15	330	280	3	↑
		203.4	35	27	22	440	280	2	
		.9	36	43	29	540	270	2	active
		204.5	42	24	24	550	240	1	broad U
		206	40	42	20	490	210	1	
		207.05	51	20	24	630	250	1	
		.1	50	18	15	450	330	1	
		.4	40	15	15	420	300	1	
		.7	44	25	23	560	300	1	↓
		208.5	40	72	31	720	300	1	v. hi potassium
		209.3	55	50	25	800		1*	
		209.4	65	40	40	880	150	1*	very low
		.45	40	48	25	560	340	1	
		.75	28	22	5	390	220	3	
		211.9	38	30	30	510	480	2	high
			active 211.9-213.5					active 211.9-213.5	
		212.6	56	30	40	870	120	1*	low clearance
		212.9	47	24	26	620	shows hi	creek bottom	
		213.2	41	18	20	500	400+	creek bottom	
			active 2.4-217						
Tape 6		325.3	21	23	12	360	300	3	double peak
		325.8	27	22	8	280	300	3	double peak
		325.9	25	26	10	280	340	4	
		326.3	28	22	8	300	300	2	
		327.4	27	18	10	250	380	4	
		330.0	30	33	18	420	200	3	good peak
		330.1	28	28	20	400	220	3	good peak
		333.6	27	23	12	260	380	3	series good peaks
		333.7	24	10	10	250	310	4	
		337.8	28	40	16	380	300	2	
		337.85	24	32	17	410	300	3	
		338.4	29	43	18	400	300	2	

Tape 6	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		338.8	28	33	12	410	310	3	
		.6	28	31	17	420	320	2	
		339.1	26	24	15	400	260	3	
		343.3	22	40	10	310	300	4	2 x loc. bkg.
			active 343.5 to 346						
		345.3	32	30	18	400	200	2	2 x loc. bkg.
		348.7	40	18	17	410	250	1*	3 x loc. bkg.
		352.1	27	16	10	325	250	4	
		357.2	31	41	12	410	150	2	
		358.4	29	40	12	500	250	2	
		366.4	28	10	5	240	300	2	3 x loc. bkg.
		371.5	28	20	10	280	500+	3	v. hi; 2 x loc. bkg.
		371.9	34	27	16	440	300	2	
		371.95	32	15	15	390	280	2	over edge Sand Lake
		372.0	32	15	5	280	300	2	edge Lake
			all channel active 372 to 374					elev. 320 ± 30 ft.	
		375.6	26	22	7	250	400	2	2 x loc. bkg.
		379.0	26	25	15	380	300	3	active area
		380.3	31	32	16	400	310	2	double peak
		382.0	28	26	15	410	250	3	
			active from 386.7 to 391						
		387.4	36	25	18	420	300	2	
		387.8	40	22	21	420	250	2	
		388	40	35	20	500	180	2	
		388.6	40	28	25	510	200	2	
		390.7	43	40	22	590	220	1	
		391.4	45	43	28	620	150-	1	hi K & Th as well
		385.0	28	12	5	200			
		374.8-375	26	22	11	260	400		3 pks.
		373.1	32	30	12	350	320	3	
		.2	36	25	12	400	300	2	
		.3	35	28	18	470	300	3	

Tape 7	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		41.5	34	44	13	460	220	2	very low; all active
		48.8	35	41	20	584	250	2	
		48.9	42	42	28	550	270	2	
		49.3	38	31	22	560	280	2	
		54.3	48	48	13	570	280	2	No TC noticed
		55.3	53	66	33	810	260	1	very low
		55.8	40	20	10	430	500+	1	very high
		57.3	39	40	22	680	240	2	low
		58.5	42	40	23	730	240	1	all active
		59.0	39	41	22	600	270	2	
		59.2	44	30	21	640	300	1	
		59.4	42	22	22	600	300	1	
		59.8	47	40	26	650	300	1	
		60.2	45	50	31	620	260	1	
		60.8	40	42	27	620	280	2	
		61.2	38	71	18	680	250	1	
		150.9	23	21	12	304	500+	3	2 x loc. bkg.
		152.7	24	22	8	320	300	3	2½ x loc. bkg.
		156.4	24	30	13	400	~500	3	2 x loc. big.
		157.5	44	70	29	740	150	3	very low
			active area 156.8 to 158.5						
		158.5	30	31	12	420	450	2	very high
		162.9	21	15	5	260	340	3	2 x loc. bkg.
		163.7	28	22	10	380	360	3	2 x loc. bkg.
		163.9	29	31	5	420	400	2	
		174.5	38	24	33	520	250	2	double peak; Th hi also
			active area 176.5 to 178						
		176.7	46	50	25	800	150	1	
		177.7	35	41	20	570	400	2	
		182.5	31	38	12	410	250	3	
		182.2	28	30	10	390	400	2	
		60.4	32	50	13	560	270		
		68.2	35	48	8	490	300		
		69.0	26	31	5	370			very high

Tape 7	Line	Fiducial	U	K	Th	Total	Altimeter	Class	Remarks
		69.8	24	20	11	270	400		
		69.35	24	18	5	260	600		
		150.1	23	22	5	250	250		
		174.9	36	28	15	600	400		

APPENDIX B

EQUIPMENT

1. Airborne Magnetometer, Barringer, Model AM-104
2. Differential Gamma Ray Spectrometer, Exploranium Corporation of Canada, Model DGRS-1000
3. Radio Altimeter, Bonzer, Model TRN-70
4. Static Inverter, Flitetronics Co., Model PC-16
5. Strip Chart Recorder, 8-Channel, Optical Type Brush, Model 16-2300-00
6. Scanner-coupler, Geometrics G-704
7. Digital Recorder, Kennedy 1600, Incremental 7 track
8. TV Recording System, Sony AVC-3400

1. Airborne Magnetometer, Barringer Research Ltd., Model AM-104

The Airborne Magnetometer is a nuclear precession instrument measuring the total magnetic field intensity. The field intensity is displayed in digital form and is also available in analogue form via converted digital information.

Specifications

Range: 20,000 to 100,000 gammas

Resolution: 1 gamma

Accuracy: ± 1 gamma

Cycle rate: 1.115 seconds

Instrument drift: 0 after 5-minute warm-up period

Output

Analogue: 2 channels

(a) 0 - 990 gammas

(b) 0 - 9 gammas

Current output, 1 ma into 2500 ohms impedence

Digital:

(a) Five cold cathode display tubes, "Nixie"

(b) B.C.D for each of 5 digits of field intensity

2. Differential Gamma Ray Spectrometer,
Exploranium Corporation of Canada, Model DGRS-1000

The DGRS-1000 is a precision airborne Gamma ray spectrometer having four channels for the measurement of Gamma radiation from up to four radioactive sources. Normally, three channels are calibrated to record the contributions of Potassium-40, Bismuth-214, and Thallium-208 to the gamma ray spectrum. The fourth channel is operated as a total intensity count, measuring the total gamma radiation above 1 MEV.

Bismuth-214 is the daughter product of Uranium-238, and Thallium-208 is the product of Thorium-232.

Special interaction elimination circuits allow almost 100% discrimination between the three radioactive elements when they are in secular radioactive equilibrium.

The instrument detects gamma radiation by the use of a thallium doped NaI crystal and three photomultiplier tubes. As the output is temperature- and voltage-sensitive, spectrum stabilization techniques are used. A Cesium-137 source in a feedback loop maintains the pulse height constant over a wide temperature range.

System is comprised of:

(a) High voltage power supply
Regulation range: ± 100 volts
Stability: 0.2% per ^{o}C
Nominal output voltage: 1000 volts

(b) Detector assembly (detector, pre-amplifier, amplifier)
Crystal: NaI(Tl), Sodium iodide thallium activated crystal
Crystal size: 8" diameter x 4" thick
Resolution: 8.3% at 1000 volts and 0.662 MEV

Amplifier
Output voltage: 0 to 10 volts - positive pulses - 1 microsec. duration
Output impedence: 0.5 ohms
Overlaod recovery time: 20 sec for 250 x overload
Linearity: ± 1%
Stability: 0.1% per ^{o}C

The detector assembly consists of the crystal enclosed in a stainless steel shell with a thin window giving a pick-up angle of 90 degrees. Three photomultiplier tubes are firmly mounted on the crystal housing. Gain and focus of each photomultiplier tube are individually variable, thus ensuring that all three are balanced. Each tube is magnetically shielded.

The crystal and photomultipliers are mounted in a protective enclosure which is lined with six inches of polyurethane foam to protect the crystal from thermal shocks. This insulation also decreases drift in the overall system. A small Cs-137 source is included in the enclosure and is used for spectrum stabilization.

The preamplifier-amplifier combination is mounted on the outside of the detector assembly.

(c) Spectrum stabilizer

Input range: 0 to 10 volts - positive pulse of 1 microsec duration

"Threshold" level: 0 to 10 volts - front panel controlled

"Window": 0 to 10 volts - front panel controlled

Threshold and window stability: .5 mV per ^{o}C

Linearity, Differential: 1.5% of full scale

Integral: 0.2% of full scale

Integration time constants: 1, 2, 5, 10 sec.

Stabilization output: ± 2 volts

Regulation: holds photopeak of Cs-137 to within 0.1% of centre in 25% photopeak shift within the system

The spectrum stabilizer is connected to the output of the main amplifier and measures the Cesium-137 gamma radiation. Pulse heights (proportional to gamma radiation energy) about a mean value of 1 volt ± 0.05 volt are divided into two parts, pulses between 0.95 volts and 1.0 volts, and those from 1.0 volt to 1.05 volts. The number of pulses in each part is summed and an error voltage is generated which drives the high voltage power supply to reduce the difference between the two parts of the Cesium response to a minimum. In this manner the spectrum is stabilized for temperature and minor input voltage variations.

(d) Single channel analyzer - Ratemeters (4 used)

Analyzer Section:

Specifications: as for spectrum stabilizer including:-

Operation mode: Differential or integral

Multiple pair resolution: 1.5 microsec

Ratemeter section:

Range: 0 to 50, 100, 1000 counts/second

Range multiplier: 1, 2, 4, 8, 16, 32, 64, 128, 256

Linearity: 1%

Output: 0 to 10 mV (custom modified to drive recorder)

Output linearity: 0.2% full scale

Meter and output zero adjustment on front panel

Within two of the analyzer-ratemeters are included spectral interaction circuits, one for the Uranium Channel, and one for the Potassium Channel.

The Thorium Channel analyzer-ratemeter and the total count channel analyzer-ratemeter are identical. The total count channel is operated in the integral mode, recording all pulses above 1 MEV.

K-40 Channel set to accept energies from	1.38 MEV to 1.53 MEV
U-238 Channel (Bi-214)	1.67 MEV to 1.85 MEV
Th-232 Channel (Tl-208)	2.49 MEV to 2.75 MEV

Spectral interaction for the Uranium Channel is accomplished by setting the Thorium Channel to full scale with a pure Thorium sample. By means of a potentiometer, the output of the Uranium Channel is reduced to background. The Potassium Channel output is then reduced to background in the same way.

A pure Uranium source is used to eliminate the contribution of the uranium peaks to the K-40 Channel.

In this manner, the three channels record the gamma radiation of the three sources with a minimum of interaction (assuming spectral equilibrium of the samples).

3. <u>Radio Altimeter, Bonzer, Model TRN-70</u>

The Bonzer radio altimeter is a vertical measuring device with a meter readout instrument in the aircraft console. It measures terrain clearance to within 5% from 80 feet to 2,500 feet. Output from the meter circuit is supplied to the analogue data recorder.

Specifications

Input power: 28 VDC, 0.6 Amps

Operating Range: 80 to 2,500 feet

Accuracy: ± 5%

Output: Meter calibrated - 80 to 2,500 feet

4. Power Inverter, Flitetronics Co., Model PC-16

Input voltage: 28 VDC, ± 2 volts

Input current: 14 Amps DC full load

Output voltage: 115 VAC, ± 5%

Power -- 250 volt amps for 115 volts AC

Freq. -- 60 ± 1 cycle/sec.

Output waveform: single phase sine wave

Weight: 16 lb.

The Flitetronic Static Inverter is an excellent DC to AC converter providing a 60-cycle, 115-voltage source with a minimum of distortion in the output waveform. It causes very little noise to be developed in the aircraft power bus. Its frequency accuracy guarantees proper operation of other AC power driven devices.

Low distortion in the output waveform and the lack of transients in the aircraft power system, result in very clean traces on the oscillograph, and proper operation of the digital magnetometer.

5. Lightbeam Oscillograph, Clevite Corporation, Model 16-2300-00

Specifications

Power requirements: 60 cps, 115 volts, 100 watts

Number of channels: 8

Recording speeds: 0.2, 0.4, 1.0, 2.0, 5.0, 10, 25, 50 inches/sec., also x 1/100 of the above (normally 0.1 inches/second)

Writing speed: in excess of 20,000 inches/second

Light source: dual filament, tungsten lamp

Trace linearity: ± 1.0% on outer channels, 0.5% on inner channels

Galvanometer protection: individually fused on rear panel

Galvanometer type: 11-2111-20, 60 A/inch

Recording paper: 11-2542-63, slow speed paper

Accessories: trace interrupt (facilitates channel identification in case of cross overs); amplitude grid mask, 0.1 inch grid; fotolyzer lamp - direct photochemical processing of exposed paper

Galvanometer impedence: 105 ohms

Fuse resistance: 75 ohms

The strip chart recorder monitored all seven analogue data channels as below:

Channel 1	Uranium	1.5" deflection = 100 counts/sec
2	Potassium	1" deflection = 100 counts/sec
3	Thorium	1.0" deflection = 100 counts/sec
4	Total Count (Scintillometer)	1.5" deflection = 800 counts/sec
5	Coarse (Magnetometer)	4.0" deflection = 990 gammas
7	Altimeter	0.5" deflection + 100' @ 300'

The eighth channel was used as an event marker producing an analogue printout of the fiducial register when each event is marked via a floor-mounted push button.

Simple Resistive Pads were used in each channel of data output to match the characteristics of the recorder. See Appendix C for further details.

The equipment was carried by a Bell 206B helicopter with the electronics for the magnetometer and scintillometer being mounted in the rear compartment with the recorder. The scintillometer detecting crystal was mounted in the baggage compartment and the magnetometer sensing head trailed in a "bird" at the end of a 20 m. cable.

The Bonzer altimeter was mounted on the lowest part of the belly of the aircraft and its readout instrument mounted in the console panel. The output also supplied the altitude channel of the recorder.

The fiducial marker provided a means of (a) marking the analogue tape at each flight strip location and (b) providing a means of writing that number on the analogue tape thus synchronizing the analogue and digital tapes. An audio tone was also generated which signalled the ficucial location on the video tape.

6. Scanner-coupler Geometrics G-704

This unit sequentially samples each instrument in the helicopter upon a command from the magnetometer. It records the header information, fiducial register information, time of day, magnetometer data, each of the four channels of scintillometer data, and finally the radar altimeter readings. It interfaces with the Kennedy tape recorder providing a 48 character record every time the print (or scan) command is generated by the magnetometer.

The unit has built in readouts for the time (24 hour clock) and the A/D converter (used for the scintillometer and altimeter data)

7. Kennedy Incremental Tape Recorder

This unit writes the data obtained by the scanner on to IBM compatible 7 track NRZI format tape. It has a maximum speed of 300 characters/second but is in fact used at approximately 100 characters per second. By using the machine in this undemanding manner, the write error rate is extremely low.

The unit has a built-in read after write function that compares the just written data (on a character by character basis) with the input data. If the two are not identical, the last (48th) character in the "word" is changed from a "B", which signifies the end of a scan, to a "C" which indicates to the processing computer that one of the characters in the 48 character word is not what was commanded. The data processing computer decides whether that particular scan is required and if so compares the data with the scans before and after the questionable data. Thus almost all writing errors are caught and eliminated.

8. Sony AVC-3400 TV recording system

The Sony TV system consists of a 3 kg. TV camera with a small television viewing screen and a 6 kg. recorder which uses ½" videotape on reels of ½ hour duration.

The TV camera is equipped with a 10 mm. wide angle lens (equivalent to about a 20 mm. wide angle lens in 35 mm. format) which is directed toward the ground. It affords a 60 degree field of view, thus looking at a strip of the surface approximately 120 meters wide for a flight height of 100 m.

All communications in the helicopter are recorded so that geologic information and comments concerning fiducials and the like are available upon replay of the tapes. Operation is easily checked by playing back the tape (in flight if necessary).

The main disadvantage is that the playback takes place in real time, and that every hour flown is an hour of video tape. The high cost of video tape demands that the tapes be reused and the old data is thus lost. However, once the tapes are played back, very little additional information needs to be retained.

CANEX PLACER LIMITED
EXPLORATION DIVISION

August 1977

V - 157 TROUT LAKE

COSTS:	MOBILIZATION/DEMOBILIZATION			
	2 men - airfare	$580		
	Freight	600		
	Truck rental	150		$ 1,330
	ROOM & BOARD	3 men 5 days @$25/ man day		375
	EQUIPMENT RENTAL	2 wk. min. @$8,000/mo.		4,000
	HELICOPTER	22 hrs. @$350/hr.		7,700
	Fuel	11 drums @$1.35/gal.		670
	SALARIES	1 navigator 1 wk. @$1,500/mo.	$ 375	
		1 equipment op 1 wk. @$1,500/mo.	375	
		1 geophysicist 1 mo. @$1,500/mo.	1,500	
		1 draughtsman 1 wk. @$1,000/mo.	250	
			$2,500	
		Benefits & Supervision 30% of above	750	
			$3,250	3,250
	MATERIALS & MAP PREPARATION/REPRODUCTION			
		Photomosaic $ 1,500		
		Photo Recording Paper 180		
		Reproductions 250		1,930
				$ 19,255

Expenditures for airborne survey of Cx and FOX claims (208 units)

$31/line mile and mobilization and demobilization

line recovered 565 line miles - 900 km.

$21/km.

J. M. Thornton

J. M. Thornton

JMT:gl

700 BURRARD BUILDING • 1030 WEST GEORGIA STREET • VANCOUVER, B.C., CANADA V6E 3A8 • (604) 682-7082

Typical Flight Record

6497

LEGEND

CRET. PLEISTOCENE

17 UNCONSOLIDATED SEDIMENTS: mostly gray-weathering unconsolidated glacial and fluvial deposits with vegetation cover and few outcrops.

13a ALASKITE: resistant, light brown to gray-weathering, fine to coarse grained alaskite and porphyritic alaskite. Local rhythymic layering, sericitic alteration, and minor fluorite. } SURPRISE LAKE BATHOLITH

PERMO-PENNSYLVANIAN

8 LIMESTONE: massive light gray-weathering locally fossiliferous and fetid limestone.

7 VOLCANIC GRAYWACKE: mainly resistant brown-weathering volcanic graywacke with minor greenstone and argillite.

6 CHERT: rusty-weathering gray to black chert, thin-bedded cherty argillite, and chert-pebble conglomerate. } CACHE CREEK GROUP

GEOLOGICAL CONTACT: definite, inferred, covered

FAULT

NOTE: GEOLOGY AND MAP UNIT NUMBERS FROM AITKEN 1959, GSC MEMO 307.

CANEX PLACER LIMITED

TROUT LAKE, B.C. NTS 104-N10

GEOLOGICAL MAP

CONTOUR INTERVAL = 500 FEET

SCALE 1:25 000

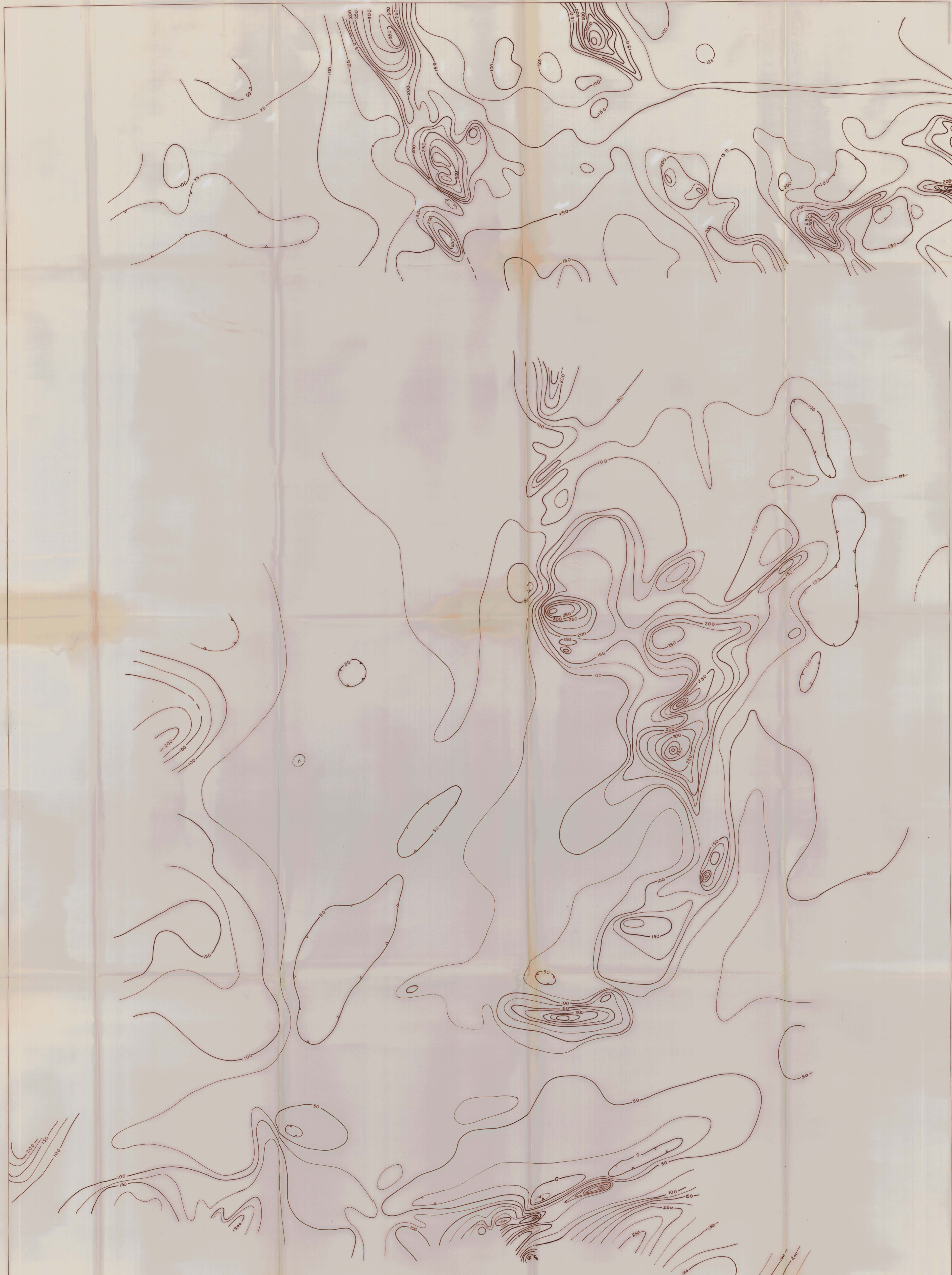
0 500 1000 2000 3000

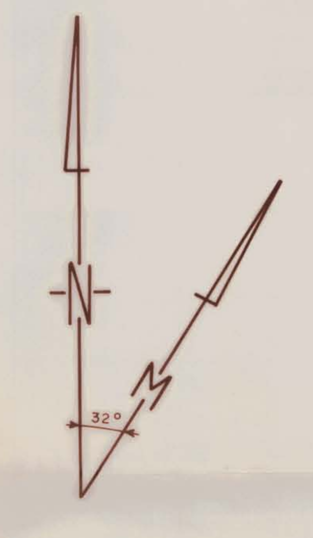
METERS

AUG., 1977. V-157 J.M.T.

DRAWN: J.L.

J. M. Thornton
Sept. 15 1977





TOTAL FIELD PROTON PRECESSION MAGNETOMETER

NOTE: 58 000 γ HAVE BEEN SUBTRACTED FROM DATA

50 γ CONTOUR

25 γ CONTOUR

CANEX PLACER LIMITED

TROUT LAKE, B.C. NTS 104-N10

CX AND FOX CLAIMS

AEROMAG PLAN

SCALE 1: 25 000

0 500 1000 2000 3000

METERS

AUG., 1977. V- 157 J.M.T.

TRACED: J.L.

J. M. Thornton
Sept. 15, 1977

• 1 1/2 X BACKGROUND (18)
○ 2 X BACKGROUND (24)
◐ 2 1/2 X BACKGROUND (30)
● 3 X BACKGROUND (36)
URANIUM CHANNEL

— — — TOTAL COUNT > 2 X BACKGROUND

U	K
Th	Tot.

Readings in c/sec

U - 1·63 - 1·89 MEV - STRIPPED TO SHOW U ONLY
K - 1·36 - 1·58 MEV - STRIPPED TO SHOW K ONLY
Th - 2·45 - 2·79 MEV
Tot 1·00 - 3+ MEV

CANEX PLACER LIMITED

TROUT LAKE, B.C. NTS 104-N10

RADIOMETRIC LOCATION

FLIGHT LINES AND FIDUCIAL OVERLAY

SCALE 1 : 25 000

0 500 1000 2000 3000
METERS

AUG., 1977 V - 157 J.M.T.
TRACED J. L.

J. M. Thornton
Sept. 15 1977