GEOLOGICAL AND GEOCHEMICAL REPORT ON THE MUN 1-20 MINERAL CLAIMS MUNROE LAKE, YUKON TERRITORY

WHITEHORSE MINING DISTRICT

LATITUDE 60° 02' NORTH LONGITUDE 132° 02' WEST

N.T.S. MAP SHEET 105 D/3E

Based on work completed between
June 25th and July 5th, 1978

For
E & B Explorations Ltd.

By
R.R. Culbert, PhD., P.Eng.

090465

D.G. Leighton & Associates Ltd.

28 February 1979

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

$ 2000.00

D.B. Craig 12 June /79.

Resident Geologist or

~~Resident Mining Engineer~~

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

B. R. BAXTER

Supervising Mining Recorder

Commissioner of Yukon Territory

CONTENTS

ILLUSTRATIONS

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MUN PROPERTY
MUNROE LAKE, YUKON TERRITORY

INTRODUCTION

This report describes the results of geological and geochemical work completed on the MUN claims during the 1978 field season. Thirty-three man days were spent mapping geology, silt sampling and prospecting for uranium. The mapping was done by John Ricker, who was assisted by Daryl Thompson and Ron Bilquist. The field work was completed between the 25th of June and the 5th of July.

Conclusions and recommendations in this report are based on the work cited above.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

1. The MUN property is comprised of 20 unsurveyed mineral claims, and is located on the west side of Munroe Lake, 22 kilometres southwest of Carcross, Yukon Territory.

2. The property is underlain by biotite quartz monzonite and aplitic quartz monzonite.

3. Several uranium anomalies, accompanied by extremely high molybdenum values, make the MUN property of at least moderate interest. Some follow-up work is recommended to determine whether or not drill targets are available.

4. Specifically, detailed grid controlled mapping-sampling should be carried out on the area of the uranium-molubdenum anomaly.

Respectfully submitted,

R.R. Culbert, Ph.D., P.Eng.

28 February 1979

GENERAL DESCRIPTIONS

Location and Access

Latitude 60° 02' North, longitude 13~~7~~5° 02' West. Located on the west side of Munroe Lake, 22 kilometres southwest of Carcross, Yukon Territory. Accessible by means of float plane or helicopter from Whitehorse.

Claims

The MUN property consists of the following claims:

Claims	Grant No.	Record Date	Expiry
MUN 1-20	YA22535-YA22566	25 April 1978	1979

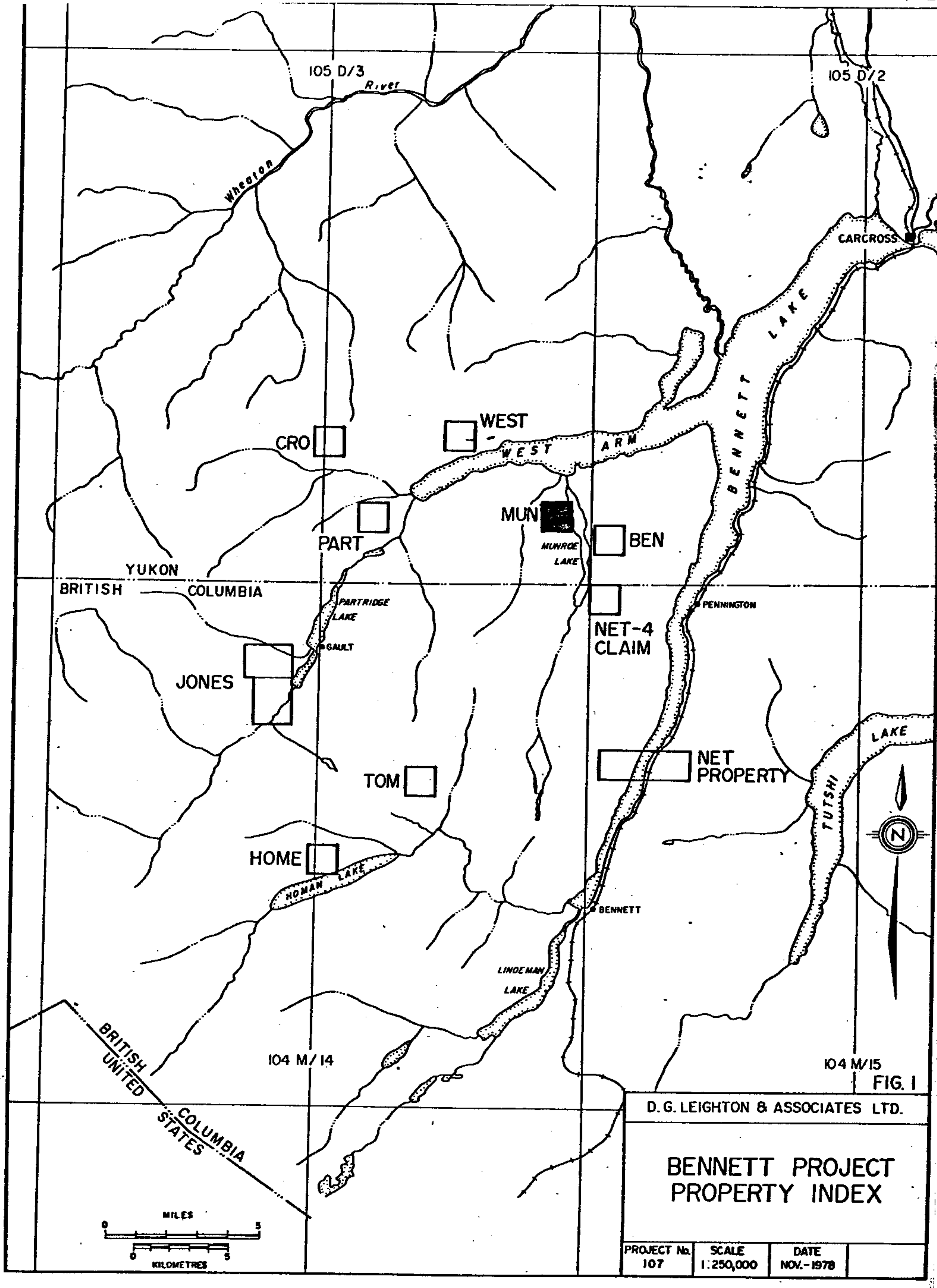

FIG. 1

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BENNETT PROJECT
PROPERTY INDEX

PROJECT No.	SCALE	DATE
107	1:250,000	NOV.-1978

GEOLOGY

Two main intrusive rock units are found on the MUN property: equigranular biotite quartz monzonite and aplite. Quartz monzonite underlies most of the property and typically exhibits granular weathering, producing a coarse sand. This phase contains more than 20% quartz, 10% biotite, traces of hornblende, and is non-magnetic. It grades into a granite in places. Radioactivity averages 160 cps. A small stock of aplitic quartz monzonite crops out near the summit of the claim area. The rock occasionally contains quartz phenocrysts and inclusions of quartz monzonite. Thin aplite and pegmatite dikes rarely cut quartz monzonite. Aplite stocks and dikes average 225 cps radioactivity.

Shear zones, fracture zones and joint surfaces show no significant change in radioactivity over background values.

GEOCHEMISTRY

Creek beds are largely covered with avalanche debris. Most creeks flow only during break-up and are otherwise dry. Alluvium and glacial drift, moraine and outwash cover creek sources in the northern part of the claim block. Talus covers much of the northwest area. Sidehills are steep, but rock exposure is generally good.

Several strong uranium anomalies were found during this reconnaissance, despite the intermittent nature of stream courses. Several moderate anomalies had relatively low organic content and high daughter product retention (uranium equilibrium). More impressive still was the extremely anomalous molybdenum results from about half of the 10 samples analysed for other metals.

Two radioactive occurrences were located in surface prospecting, both of small size and of low uranium-in-rock geochemistry. One thin pegmatite ran 39 ppm U and 81 ppm Th.

Geological and geochemical data for the MUN property are combined on Figure 5, in pocket.

TABLE I

MUN PROPERTY GEOCHEMICAL DATA

EXPLANATION OF HEADINGS
*********** ** ********

SM-- A ONE LETTER CODE DENOTING WHO TOOK THE SAMPLE

SAMP NUMB-- FIELD NUMBER ASSIGNED TO SAMPLE. A '*' FOLLOWING NUMBER INDICATES THAT MULTI-METAL ANALYSIS WAS MADE. SEE APPENDIX I.

TYP-- TYPE OF SAMPLE TAKEN, AS FOLLOWS:
- STRM- STREAM SILT CR WATERCOURSE.
- LAKE- LAKE OR POND SEDIMENT.
- SPRG- SEDIMENT FRCM SPRING OR SEEP.
- LINS- LINEAMENT OR GULLY SOIL SAMPLE.
- GRID- SOIL TAKEN BY GRID OR LINE SPACING.
- AUGR- AUGER SAMPLE OF SOIL OR BOG.
- ROCK- ROCK SAMPLE.

SPEC GRAV-- SPECIFIC GRAVITY OF SAMPLE IN GMS/CC. GOOD SILT OR POWDERED ROCKS ARE ROUGHLY 1 GM/CC, WHILE ORGANIC SAMPLES RANGE MUCH LOWER.

URANIUM PPM-- PARTS PER MILLICN URANIUM, WITH STANDARD ERROR FOR THE DETERMINATION IN BRACKETS.

PB-214-- LEAD-214, A URANIUM DAUGHTER PRODUCT WHICH FOLLOWS THE RADON ESCAPE POINT IN DECAY SERIES. GIVEN IN EQUIVALENT PPM URANIUM.

RADM 226-- RADIUM 226, A URANIUM DAUGHTER PRODUCT WHICH FOLLOWS THE MAJOR DISEQUILIBRIUM POINT IN THE DECAY SERIES, BUT OCCURS BEFORE RADON. GIVEN IN EQUIVALENT PPM URANIUM.

TH PPM-- PARTS PER MILLION THORIUM.

EQU LIB-- PERCENTAGE EQUILIBRIUM BETWEEN URANIUM AND ITS DAUGHTER RADIUM. VALUES OVER 100 INDICATE DAUGHTER EXCESS AND ARE TYPICAL OF CERTAIN TYPES OF LEACHING. LOW VALUES INDICATE MOBILIZED URANIUM (WATER TRANSPORT ANOMALY) IN SEDIMENTS AND SOILS, OR RELATIVE LEACHING OF RADIUM FROM ROCKS. BLANKS DELETE CASES OF URANIUM WITHIN TWO STANDARD ERRORS OF ZERO-- (IE.-- POOR STATISTICS FOR RATIOS).

RAD ESC-- RADON ESCAPE COEFFICIENT, GIVING DISEQUILIBRIUM DUE TO RADON ESCAPE FROM RADIUM. HIGH VALUES INDICATE LOOSELY HELD RADIUM, TYPICAL OF SPRING OR SEEPAGE ACCUMULATIONS.

FIELD COMMENTS-- ARE NOTES MADE BY SAMPLER TO FACILITATE RECCGNITION OF THE SAMPLE CASE.

D.G. LEIGHTON AND ASSOC. LTD.
NOVEMBER 2, 1978.

**** MUN PROPERTY-- MUNROE LAKE AREA, YUKCN

S M	SAMP NUMB	TYP	SPEC GRAV	URANIUM PPM	PB-214 PPM EQV	RADM 226	TH PPM	EQU LIB	RAD ESC	FIELD COMMENTS
A	MU 1	STRM	1.07	24 (7)	4 (1)	4	19	20		MUN K CREEK
A	MU 2	STRM	1.06	28 (8)	6 (1)	11	24	39		
A	MU 3	STRM	1.00	16 (8)	5 (1)	5	24			
A	MU 4	STRM	0.67	44 (14)	16 (3)	35	62	80	53	MUN J CREEK
A	MU 5	STRM	0.52	99 (17)	14 (3)	38	54	38	62	
A	MU 6*	STRM	0.69	155 (12)	25 (2)	48		30	46	
A	MU 7	STRM	0.89	52 (10)	9 (2)	14	34	27	34	
A	MU 8	STRM	0.84	62 (11)	13 (2)	14	39	24	6	
A	MU 9	STRM	0.69	95 (13)	11 (2)	12	46	13	9	MUN I CREEK
A	MU 10*	STRM	0.54	371 (20)	6 (3)	70	57	19		MUN H CREEK
A	MU 11*	STRM	0.94	84 (9)	8 (1)	22	21	26	62	
A	MU 12	STRM	0.93	33 (9)	10 (2)	11	25	33	5	
A	MU 13*	STRM	0.68	101 (13)	7 (2)	20	28	20		MUN C CREEK
A	MU 14	STRM	1.04	7 (8)	7 (1)	18	36		59	MUN A CREEK
A	MU 15	STRM	0.95	35 (9)	11 (2)	13	38	37	12	
A	MU 16*	STRM	0.81	88 (12)	16 (2)	32	29	36	47	SIDE CK NTH ACK
A	MU 17	STRM	1.05	31 (9)	10 (1)	18	42	59	40	MUN A CREEK
A	MU 18	STRM	1.09	36 (9)	15 (1)	15	34	43		SIDE CK NTH ACK
A	MU 19	STRM	1.02	25 (9)	14 (2)	15	40	63	10	SIDE CK STH ACK
A	MU 20	STRM	0.93	66 (10)	6 (2)	16	47	25		NTH FORK A CK
A	MU 21	STRM	0.89	49 (10)	12 (2)	16	46	34	25	STH FORK A CK
A	MU 22	STRM	0.86	33 (9)	3 (1)	17	27	53		MUN L CREEK
A	MU 23	SPRG	0.98	23 (8)	7 (1)	14	30	62		MUN SPRING
A	MU 24	STRM	0.63	72 (13)	9 (2)	26	34	36		MUN L CREEK
A	MU 25	STRM	0.69	42 (11)	9 (2)	19	27	47		MUN STH SIDE L
A	MU 26	STRM	0.91	21 (9)	9 (2)	14	24	67	32	MUN L CREEK
A	MU 27	STRM	0.71	31 (11)	5 (2)	9	27	30		MUN DRY CREEK
A	MU 28	SPRG	0.41	147 (20)	6 (4)	26	41	17		MUN SMALL SEEP
A	MU 29	LINS	0.81	28 (10)	8 (2)	15	24	56		MUN SOIL GULLY
A	MU 30	STRM	0.87	32 (9)	6 (2)	11	30	34		MUN SMALL CREEK
A	7178-8	ROCK	1.33	8 (4)	9 ( )	13	17		32	
B	MU 1	STRM	0.85	29 (9)	6 (2)	8	31	29		E DR TRIB K CK
B	MU 2	STRM	0.75	49 (12)	12 (2)	28	38	58	55	E DR TRIB K CK
B	MU 3	STRM	1.01	58 (8)	5 (1)	18	26	31		JUST S K CK
B	MU 4	STRM	1.03	24 (9)	12 (2)	20	51	86	41	N FRK J CK 3200
B	MU 5	STRM	1.02	29 (9)	10 (1)	9	44	32		N FRK J CK
B	MU 6*	LINS	0.50	243 (20)	10 (3)	42	58	17		RAD PERMA FROST
B	MU 7	STRM	0.85	45 (10)	8 (2)	18	43	40		J MAIN BELOW FK
B	MU 8	STRM	0.95	38 (9)	5 (2)	17	50	45		N FRK J CK
B	MU 9	STRM	0.82	73 (11)	8 (2)	21	50	29		N FRK J CK
B	MU 10	STRM	0.79	50 (11)	9 (2)	19	51	38		N J CK
B	MU 11	LINS	0.96	(9)	10 (2)	18	45		44	I CK SOIL
B	MU 12*	STRM	0.80	119 (12)	11 (2)	26	24	21	54	D CK 2500 FT
B	MU 13	STRM	0.69	132 (14)	10 (2)	28	39	21		D CK 2650 FT
B	MU 14	STRM	0.88	61 (9)	3 (1)	11	25	19		C CK 2600 FT
B	017781	ROCK	1.26	18 (4)	4 ( )	6	19	34		BG ROCK I CK
B	017782	ROCK	1.19	14 (5)	13 (1)	16	64	120	22	I CK HOT SPOT
B	17782A	ROCK	1.31	39 (6)	21 (1)	22	81	57	4	I CK HOT SHEAR
B	296781	ROCK	1.26	12 (4)	7 ( )	6	12	54		STH SIDE K CK
B	306782	ROCK	1.16	17 (5)	13 (1)	14	28	86	6	J GULLY GRAN
J	5 32	ROCK	1.29	6 (3)	2 ( )	3	13			CHLCR GD10
J	6 36	ROCK	1.19	10 (4)	7 (1)	5	26	57		BIO QMONZ
J	6-38C	ROCK	1.10	9 (4)	9 (1)	13	20		29	QMCNZ SHEAR

BENNETT PROJECT - 1978 GEOCHEMICAL DATA

**** MUN PROPERTY-- MUNROE LAKE AREA, YUKON

S M	SAMP NUMB	TYP	SPEC GRAV	URANIUM PPM	PB-214 PPM EQV	RADM 226	TH PPM	EQU LIB	RAD ESC	FIELD COMMENTS
J	6-38D	ROCK	1.06	(4)	12 (1)	16	23		23	CHLORO QMONZ
J	6- 39	ROCK	1.16	(4)	7 (1)	9	21			QTZ VEIN
J	6- 40	ROCK	1.15	8 (4)	7 ( )	11	17		38	QMONZ SHEAR
J	7-45A	ROCK	1.27	20 (4)	11 (1)	14	38	70	15	J GULLY APLITE
J	7-45B	ROCK	1.33	6 (4)	10 (1)	14	46		27	Q MCNZ
J	7- 46	ROCK	1.23	3 (4)	8 ( )	8	14			PEGMATITE
J	7-48A	ROCK	1.11	4 (4)	4 ( )	4	18			
J	7-48B	ROCK	1.03	29 (4)	7 (1)	13	10	45	40	MINEN 8-269
J	8-51B	ROCK	1.02	6 (4)	8 (1)	8	13			CALCITE FRACT
J	8-51C	ROCK	1.18	19 (5)	9 (1)	16	41	84	43	QMCNZ SHEAR
J	9 65	ROCK	1.24	16 (4)	7 (1)	7	40	46		
J	8 54B	ROCK	1.13	(4)	5 ( )	4	14			QMONZ SHEAR
J	9 65	ROCK	1.16	15 (5)	10 (1)	14	35	95	26	LATR CR APLITE
J	10 83	ROCK	1.19	20 (5)	11 (1)	12	34	61	4	APLITIC STOCK
T	MU 1	STRM	0.73	109 (13)	10 (2)	29	36	26	64	PCSBL E CRK
T	MU 2	STRM	0.74	99 (12)	11 (2)	22	39	22	50	SILT SND & ORGS
T	MU 3	STRM	0.93	46 (10)	12 (2)	18	36	40	32	SND & ORG
T	MU 4	STRM	0.81	84 (12)	13 (2)	33	51	39	59	SILT & CRS SND
T	MU 5	STRM	0.93	108 (11)	14 (2)	33	39	31	56	SILT & SND
T	MU 6	STRM	0.75	155 (14)	14 (2)	51	45	33	72	N FORK E CR
T	MU 7*	STRM	0.89	192 (13)	15 (2)	41	49	21	62	SND & GRVL
T	MU 8*	STRM	0.66	202 (15)	12 (2)	44	41	21	71	VRY ORG
T	MU 9	STRM	0.76	98 (12)	10 (2)	27	35	27	61	
T	MU 10	STRM	0.86	65 (10)	5 (2)	8	38	12		
T	MU 11	STRM	0.85	13 (11)	10 (2)	20	60		49	N FORK I CR
T	MU 12	STRM	0.65	49 (13)	19 (2)	16	28	33		FN TO CRS SND
T	MU 13	STRM	0.76	74 (12)	14 (2)	26	36	35	45	SNDY SILT & ORG
T	MU 14*	STRM	0.66	192 (16)	13 (3)	36	50	19	62	SILT & SND
T	MU 15	STRM	0.40	676 (31)	18 (5)	121	81	17		SILT SND & ORG
T	MU 16	LINS	1.04	63 (10)	20 (2)	36	36	58	43	QZ MONZ SND
T	MU 17	LINS	1.07	25 (8)	15 (1)	18	28	74	15	APLITE SND
T	30610	ROCK	1.15	18 (4)	10 (1)	9	25	50		SLICKENSIDE
T	30611	ROCK	1.34	17 (5)	6 (1)	8	68	48		QMONZ 310CPS

APPENDIX "A"

ANALYTICAL PROCEDURE

LEGS - LOW ENERGY GAMMA SPECTROMETRY

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LEGS - LOW ENERGY GAMMA SPECTROMETRY

INTRODUCTION

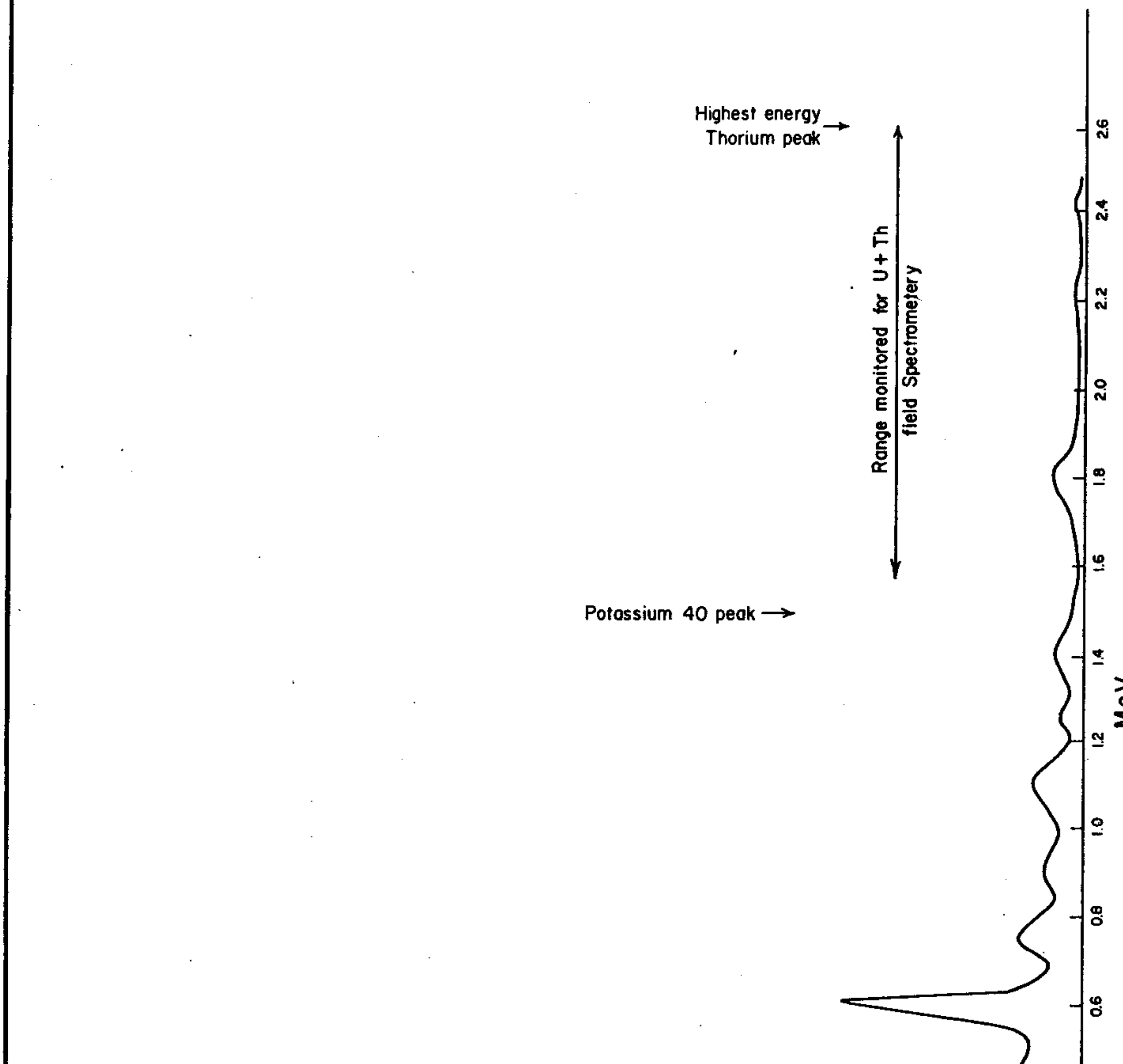
Low energy gamma spectrometry (LEGS) provides a method of determining uranium, thorium and U^{238} daughter products Pb^{214} and radium in geological samples, and has unique advantages when compared with other techniques. The system described here was developed by D.G. Leighton & Associates Ltd. with two objectives in mind. One was to provide an accurate assay facility which could be used in the field, giving field personnel rapid feedback which is particularly valuable on regional type programs. The second objective was to tackle the problem of radioactive disequilibrium. It was felt that routinely monitoring equilibrium would be useful in interpreting mobilizing mechanisms involved in uranium transport and tracking anomalies back to their source. The technique has proven to be reliable and highly cost effective in a variety of exploration programs.

METHOD

General

Conventional gamma spectrometry in geological exploration is severely limited for two reasons. First, because very high background gamma flux occurs at low energy levels (below 1 MeV), conventional systems are constrained to measure only the highest portion of the natural gamma energy range (above 1 MeV) and so cannot measure uranium directly (requiring measurements below 0.1 MeV) determining instead potassium, thorium and Bi^{214}. Unfortunately, if the geological system is in disequilibrium, considerable error will result in the value for uranium (from reliance on these measures as an indicator of uranium). In natural systems, especially in sediments and weathered rock, disequilibrium is the rule rather than the exception, due to the varying half lives and chemistries of uranium daughter products. The second limit in conventional systems is that, because only measurements at high energy levels are made, large statistical errors are introduced since at these energy levels, very low count rates occur (see Figure 1).

The LEGS system avoids both of these limitations. Measurement of the gamma spectrum at low energy levels (between 0.05 and 0.4 MeV) is achieved by ringing a 7 cm radius lead shield around both the sample and a "center-well" scintillating crystal to screen out background radiation. Since high count rates are measured at these low energy levels, a much lower statistical error exists. Moreover, uranium can be measured directly, together with two of its daughter products, so that the degree of disequilibrium in the system can be determined.



AN ORDINARY ROCK GAMMA SPECTRUM

FIGURE 1

The LEGS system, then, is a laboratory or field base method, involving a lead shielded scintillating crystal and a pulse height analyzer capable of integrating counts across preset segments of the gamma spectrum. A weighted 8.7 cc sample of the material to be analyzed is placed in a plastic vial and inserted into the scintillating crystal. Pulse counts are monitored by the pulse height analyzer and the .05 - .4 MeV gamma spectrum is broken into four segments and measured. Resultant numbers are entered into a programable desk calculator to obtain uranium and thorium content in ppm and, Ra^{226} and Pb^{214} content in percent equilibrium or ppm uranium equivalents. Background radiation corrections are involved for samples of low radioactivity and self absorption corrections for those rich in uranium or thorium.

The technique is calibrated using Geological Survey of Canada Radioactive Rock Standards, and chemical standards from Min-En Laboratories and the B.C. Department of Mines. Figure 2 shows the standardization results for uranium. These samples were counted for at least 4,000 seconds each, however, and in the usual 400 - 1,000 second geochemical analysis runs it is the counting statistic uncertainty which almost entirely controls the accuracy.

Components Measured

Although the decay sequence of uranium is very complex it may spectrographically be broken into three components (Table 1), within which the half-lives of the daughters are sufficiently short that there is unlikely to be noticeable separation of the members by natural chemical processes. The first component includes the uranium isotopes and their short lived daughter Th^{234}.

CALIBRATION STANDARDS FOR URANIUM BY L.E.G.S.

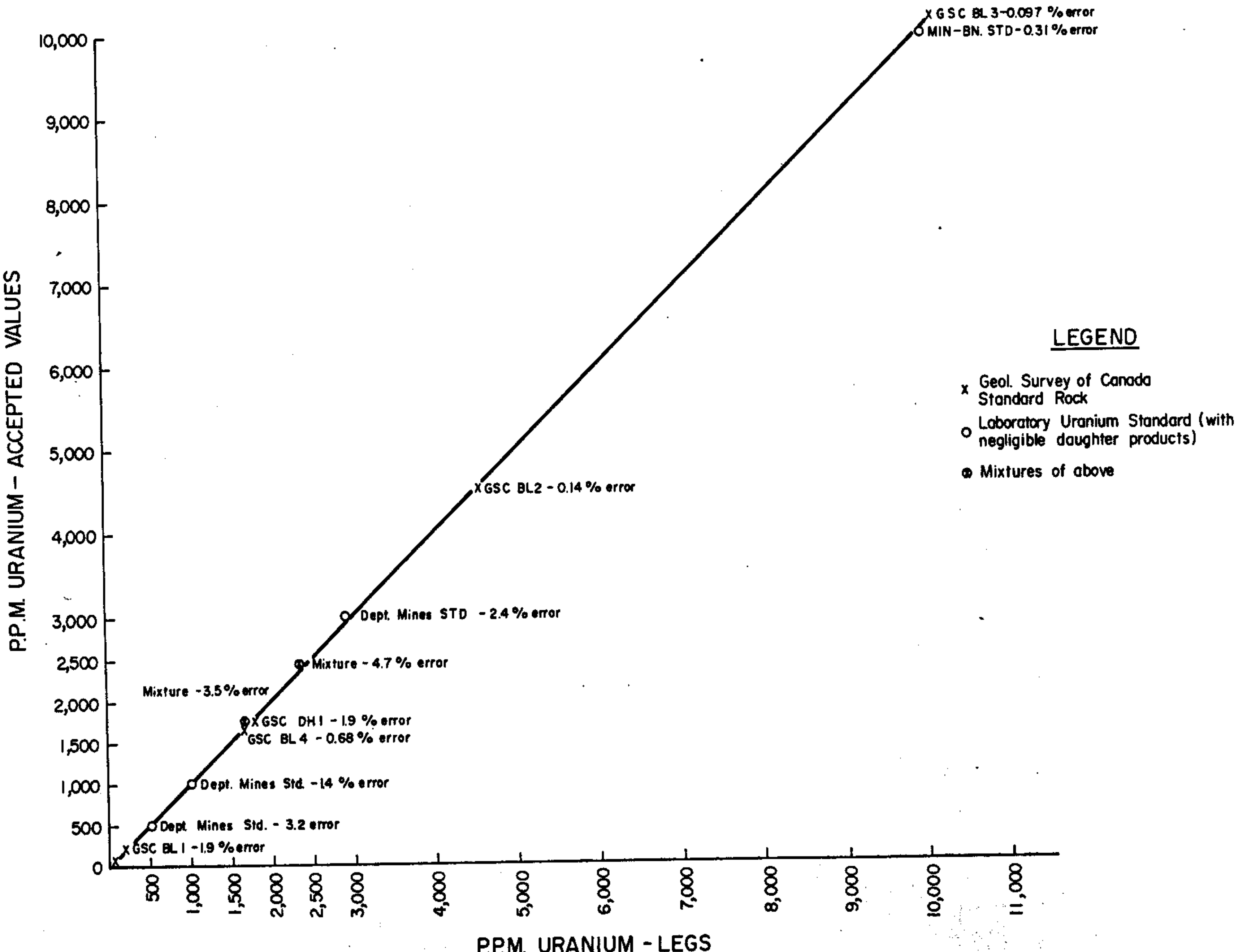


TABLE 1

DISEQUILIBRIUM COMPONENTS IN U^{238} DECAY SEQUENCE (SIMPLIFIED)

	Isotope	Half Life	Importance In LEGS	Channel (Fig. 3)	Remarks
1st Component	U^{238}	4.51 x 109 yr.			
	Th^{234}	24.1 days	Major	A	Peaks at 93 and 64 KEV
	P_q^{234}	6.75 hr.			
	U^{234}	2.47 x 105 yr.	U-Minor	A	
2nd Component	Th^{230}	8.0 x 104 yr.	U-Minor	A	Major disequilibrium point
	Ra^{226}	1602 yr.	Major	B	Peak at 186 KEV
3rd Component	Rn^{222}	3.82 days			Disequilibrium due to mobility of radon gas
	Po^{218}	3.05 min.			
	Pb^{214}	26.8 min.	Major	C & D	Peaks at 242, 295 and 352 KEV
				A	Conversion x-rays at 80 KEV
	B_i^{214}	19.7 min.			Higher energy gamma emission
	Po^{214}	1.6 x 10.4 sec.			
	Pb^{210}	22.0 yr.			
	B_i^{210}	5.0 days			
	Po^{210}	138.4 days			
	Pb^{206}	Stable			

Most radiation from the U^{235} decay series may be included in this component. The 80,000 year half-life of Th^{230} provides the first break in the uranium decay series and in view of the differing chemistry of U and Th, this is a major point of disequilibrium. Th^{230} itself produces negligible gamma radiation, and so may be grouped with its daughter product, radium. Ra^{226} has a 1,602 year half-life and a chemistry similar to the alkaline earths. Its immediate daughter Radon forms the second disequilibrium break in the decay chain, for although it has a short half-life, its gaseous state gives it mobility (especially during grinding or preparation of geochemical samples). Radon itself is not a gamma emmitter, but its daughter Pb^{214} has three important low energy wave lengths, and the subsequent Bi^{214} has a variety of high energy emmissions.

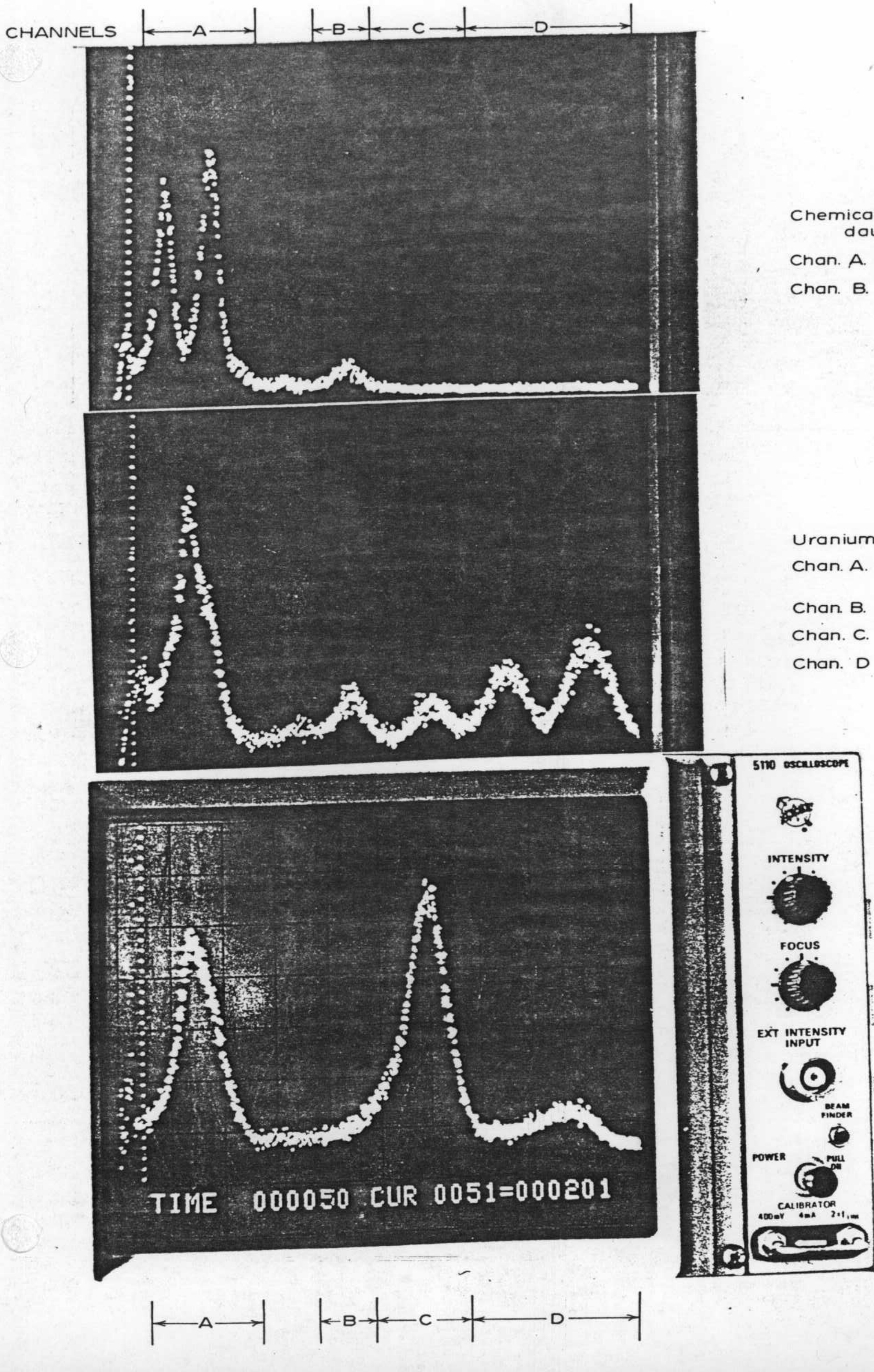
Two other radioactive components must be considered. The first of these is thorium, which is generally considered to have a fixed radiation signature in view of the short half-lives of its daughters and the especially close grouping of its major gamma emmitters. The second additional component is due to the one step decay of potassium, which does not significantly effect the technique.

Figure 3 shows the spectra of the three components of uranium radiation and thorium as viewed on the pulse height analyser. It also demonstrates how the spectrum is broken into four channels across which the counts are automatically integrated.

Precision

Both uranium and thorium are difficult elements in quantitative analysis, and the level of precision in geochemical determinations tends to be low. Figure 4 shows the results from splits

COMPARISON OF GAMMA ENERGY DISTRIBUTIONS IN THE 50-400 KEV RANGE



Chemical uranium, separated from daughter products

Chan. A. U^{238} (Via $Th.^{234}$)

Chan. B. U^{235} (Via $Th.^{231}$)

Uranium ore – approx. equilibrium

Chan. A. U^{238} and X – Rays from Pb^{214} decay

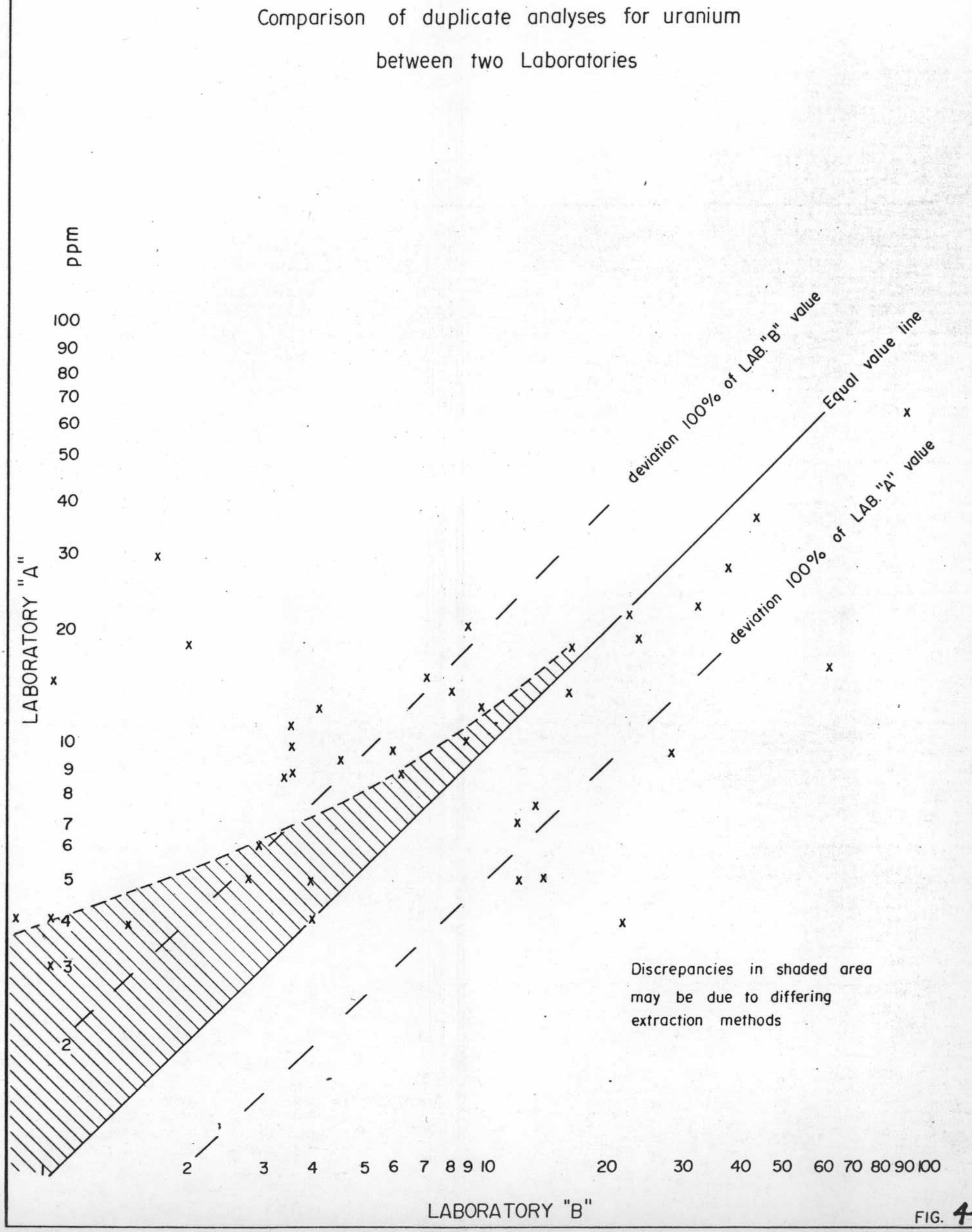
Chan. B. U^{235} and Ra^{226}

Chan. C. $Pb.^{214}$

Chan. D Pb^{214}

Thorium sample showing full cathode ray screen for pulse height analyser

FIG. 3



Comparison of duplicate analyses for uranium
between two Laboratories
ppm
LABORATORY "A"
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
deviation 100% of LAB."B" value
Equal value line
deviation 100% of LAB."A" value
Discrepancies in shaded area
may be due to differing
extraction methods
1
2
3
4
5
6
7
8
9
10
20
30
40
50
60
70
80
90
100
LABORATORY "B"

FIG. 4

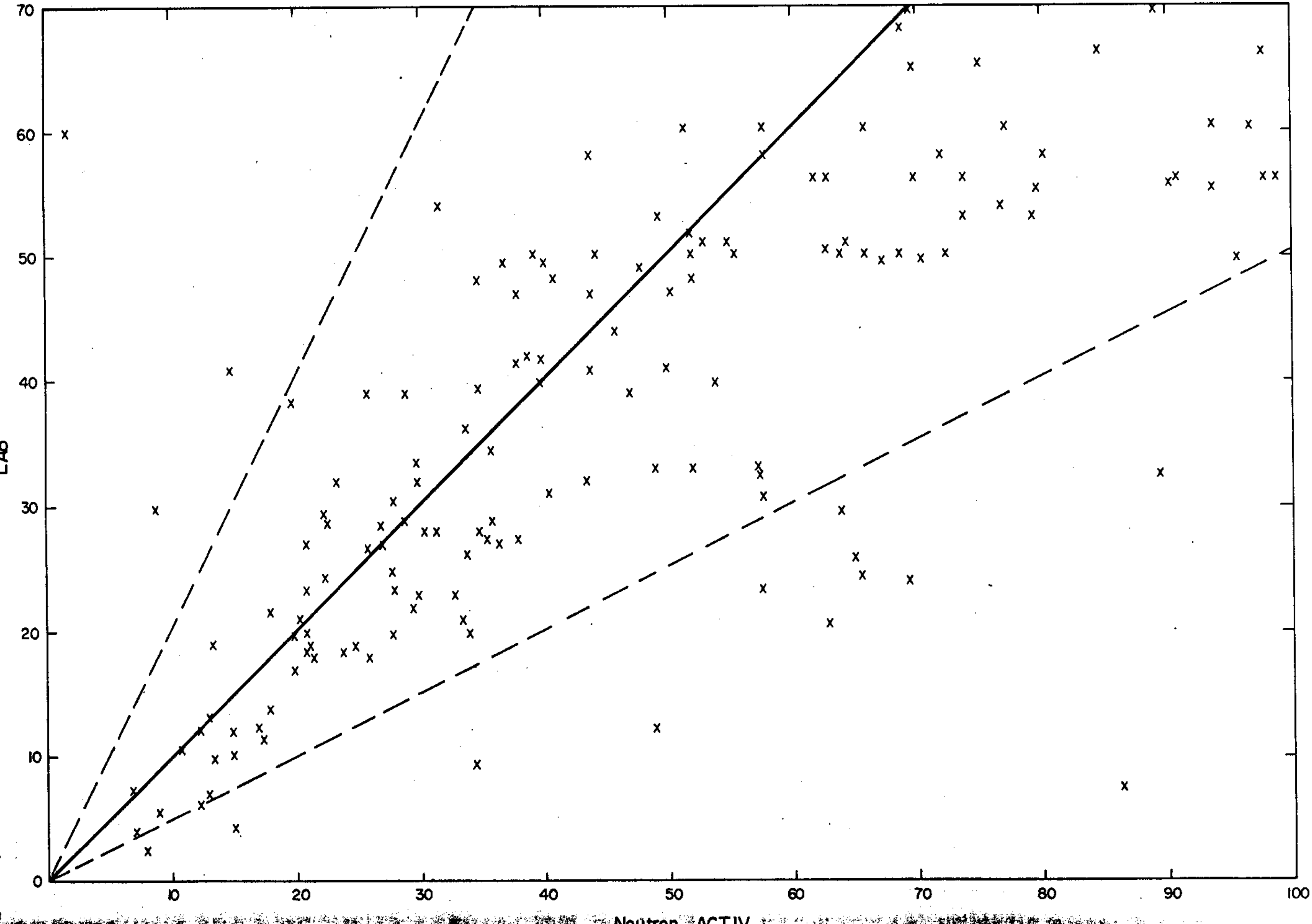
of a group of -80 mesh silt samples sent to two different laboratories, and Figure 5 gives a similar example of a laboratory fluorimetric analysis (with unusually strong acid extraction) compared to neutron activation. The results show clearly that ordinary uranium geochemical determinations are really only semi-quantitative. "Assay-mode" delayed activation neutron analysis is as good as is rountinely available, in our opinion.

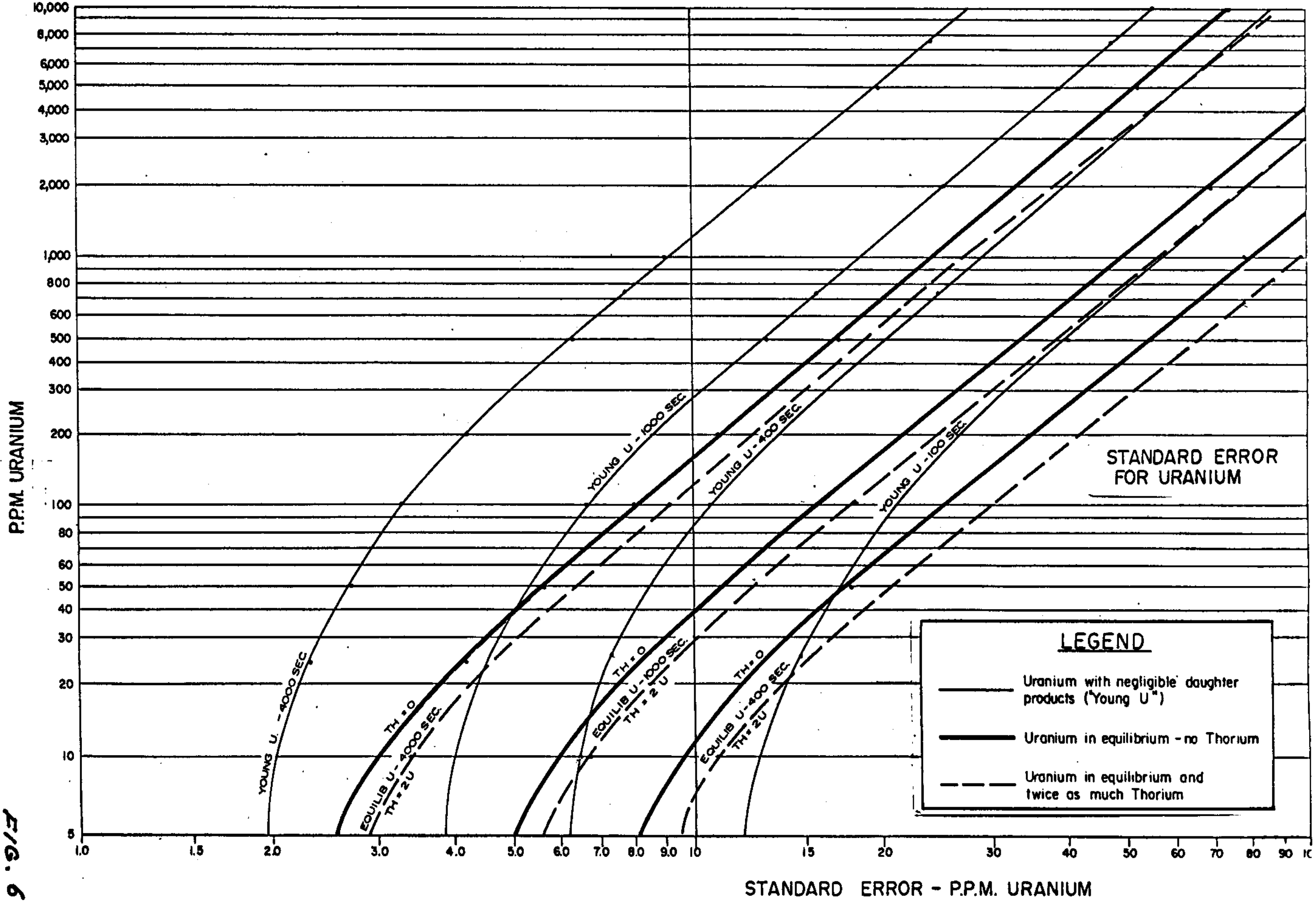
In statistical theory, the standard error (expected standard deviation) of a number produced by counting events is very close to the square root of that number. In practice, this is the controlling factor in precision for routine analysis by the LEGS technique, with other factors such as sample reloading differences and long term drift having little additional influence. This has the practical result of allowing quite accurate calculation of a standard error for each analysis, given the count on each of the spectrum channels monitored. Standard error curves for uranium and Pb^{214} in a variety of circumstances are shown in Figures 6 and 7 assuming a typical background radiation level and a sample density of 1 gm/cc.

Limitations

1. The main limitation of the LEGS technique in exploration geochemistry (at least with the present small crystal size) depends on the definition of "anomaly". If a few ppm is considered significant and Pb^{214} cannot substitute for uranium, then the lengthy counting times involved make another approach more applicable. Figure 6 shows the relationship of counting time to precision.

N. A. Vs. LAB. URANIUM P.P.M.





STANDARD ERROR FOR URANIUM
P.P.M. URANIUM
STANDARD ERROR - P.P.M. URANIUM
YOUNG U - 4000 SEC.
YOUNG U - 1000 SEC.
YOUNG U - 400 SEC.
YOUNG U - 100 SEC.
TH = 0
EQUILIB U - 4000 SEC.
TH = 2U
EQUILIB U - 1000 SEC.
EQUILIB U - 400 SEC.
LEGEND
Uranium with negligible daughter products ("Young U")
Uranium in equilibrium - no Thorium
Uranium in equilibrium and twice as much Thorium

FIG. 6

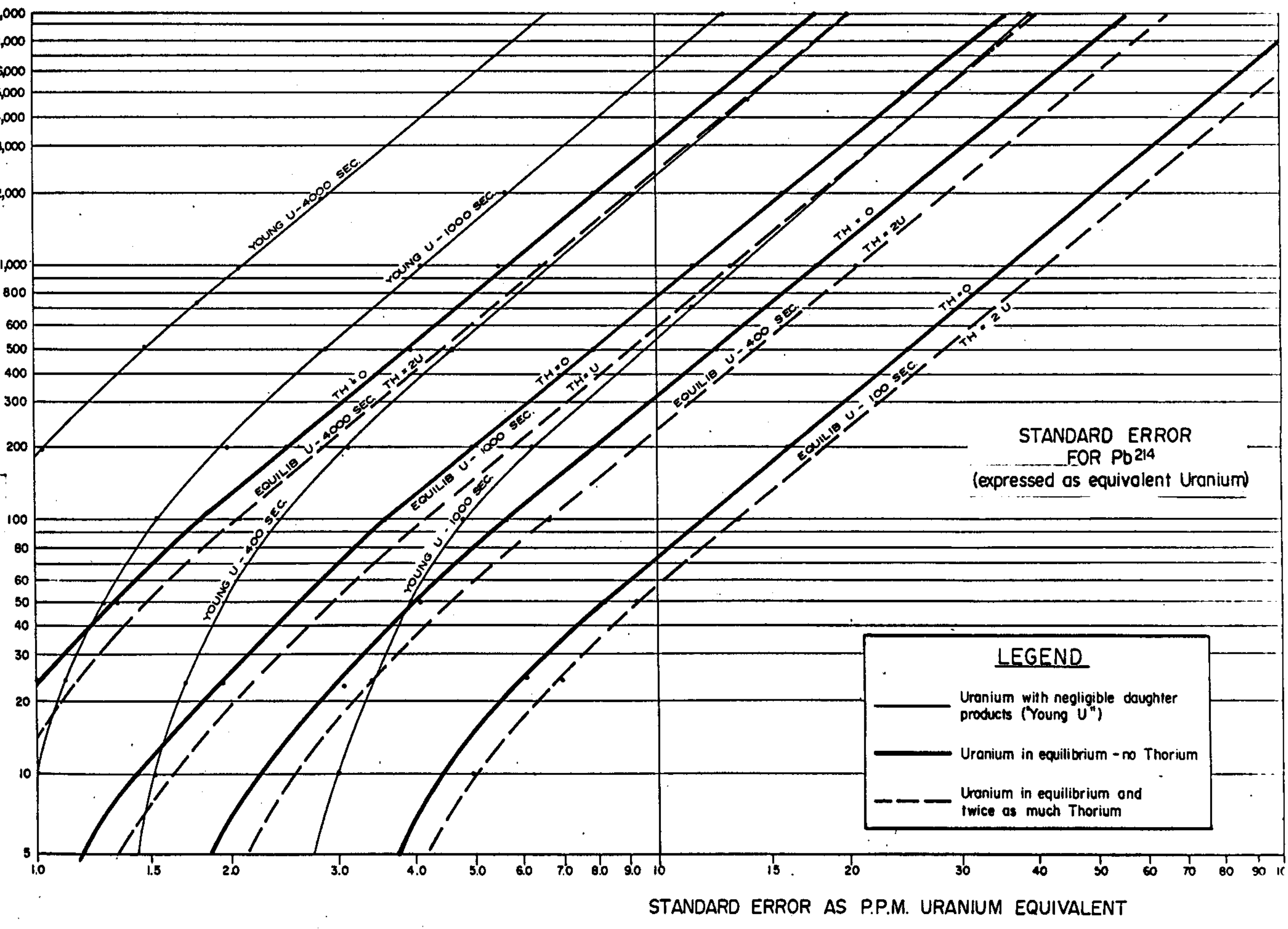

STANDARD ERROR
FOR Pb^{214}
(expressed as equivalent Uranium)
P.P.M. URANIUM
STANDARD ERROR AS P.P.M. URANIUM EQUIVALENT
YOUNG U - 4000 SEC.
YOUNG U - 1000 SEC.
YOUNG U - 400 SEC.
YOUNG U - 1000 SEC.
EQUILIB U - 4000 SEC.
EQUILIB U - 1000 SEC.
EQUILIB U - 400 SEC.
EQUILIB U - 100 SEC.
TH = 0
TH = 2U
TH = 0
TH = U
TH = 0
TH = 2U
TH = 0
TH = 2 U
LEGEND
Uranium with negligible daughter products ("Young U")
Uranium in equilibrium - no Thorium
Uranium in equilibrium and twice as much Thorium

FIG. 7

2. The very heavy elements tend to absorb radiation in the lowest energy channel. Where high uranium or thorium contents are involved, an interval correction for this effect is easily made. The only element likely to be a problem, therefore, is lead, with which 1,000 ppm gives roughly a 0.5% reduction in counts for that channel. This is likely to be a limitation only in working with certain ores.

3. Although thorium should, in theory, remain fairly close to equilibrium throughout its short decay sequence, cases of apparent thorium disequilibrium have been observed. This may cause problems in weathered, thorium-rich rocks, and is under investigation.


WEST ARM
BENNETT LAKE
2152' a.s.l.
MUNROE LAKE
ELEV. 2170'±
LATREILLE CREEK
Uranium-
Moly Anomaly
QM
A B C D E F G H I J K L
METERS
0 100 200 400 600
Munroe
Lake
Creek
Latreille
0 1500 3000 FEET
0 400 800 METRES
LEGEND
Alluvium, talus, moraine, outwash
Aplitic intrusives
QM Quartz monzonite
Geological boundary assumed
H Creek letters for reference
X Radioactive occurrence (2x or greater background)
Existing claim posts; claim line
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. CULBERT
FIG. 5
D. G. LEIGHTON & ASSOCIATES LTD.
MUN PROPERTY
GEOLOGICAL & GEOCHEMICAL COMPILATION
PROJECT BENNETT
PROJECT No. 107
SCALE 1:10,000
DATE NOV.-1978