REPORT ON THE SYN CLAIM

OLIVER, B.C.

OSOYOOS MINING DIVISION

LATITUDE 49° 13' N; LONGITUDE 119° 35' W

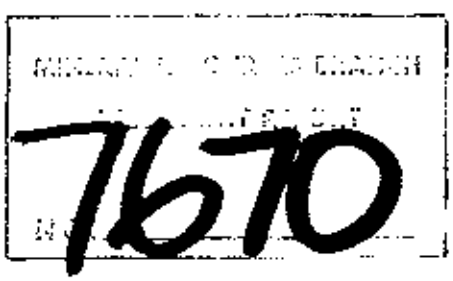
N.T.S. MAP SHEET 82E/4E

For

British Newfoundland Exploration Ltd.

By

D.G. Leighton



D.G. Leighton & Associates Ltd.

Vancouver, B.C.

17 November 1979

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ILLUSTRATIONS

TELEPHONE (604) 731-7307

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GEOLOGICAL CONSULTANTS

3155 WEST 12TH AVENUE
VANCOUVER, B.C.
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REPORT ON THE SYN MINERAL CLAIM
OLIVER, B.C.

INTRODUCTION

This report describes the results of a survey completed over parts of the SYN mineral claim which forms part of the OLIVER property. Work was part of a larger program of uranium exploration covering the Okanagan Valley and surrounding regions. Field work was done at intervals in the Summer of 1979.

The conclusions and recommendations set forth in this report are based on the results shown.

SUMMARY AND CONCLUSIONS

1. The OLIVER property comprised of 7 unsurveyed mining claims (103 units) held by British Newfoundland Exploration Ltd., is situated roughly 3 miles northwest of Oliver, British Columbia.

2. The property is accessible by road via the Sawmill (Burnell) Lake road.

3. Granitic rocks of Cretaceous age underlie most of the claims. These intrude carboniferous Kobau Group metasediments which are exposed especially on the southern portion of the property.

4. A north-south trending lineament passing through the centre of the SYN claim contains unconsolidated material which was geochemically sampled for uranium.

5. A thick uraniferous layer was found which coincides with alkaline soils and muds located within the lineament valley.

6. The source of the uranium is not known but one possibility is that it may be from primary mineralization located in intragranitic faults. The lineament valley might contain such a fault.

Respectfully submitted,

D.G. Leighton

D.G. Leighton, B.Sc.

D. G. LEIGHTON

17 November 1979

GENERAL DESCRIPTIONS

Location and Access

The OLIVER property is located three miles northwest of Oliver, British Columbia. This area is readily reached via the Sawmill (Burnell) Lake road from Oliver. The geodetic co-ordinates are 49° 13'N latitude; 119° 35'W longitude.

Topography of the area consists of open grazing land with good rock exposures. The average elevation is 1500 feet ASL.

History

There is no record of previous uranium exploration work having been carried out on the OLIVER property apart from that done by ourselves. The area has, however, been extensively tested for gold and silver mineralization. The Fairview mining camp is located immediately south of the property and numerous pits and old workings (mainly on quartz veins) exist. In several instances old mineral leases related to this earlier work occur as inliers in the OLIVER property. These are shown as accurately as possible on the accompanying Grouping Map. The Oliver silica quarry lease is also shown.

Claims

The OLIVER property consists of the following mining claims held by British Newfoundland Exploration Ltd.:

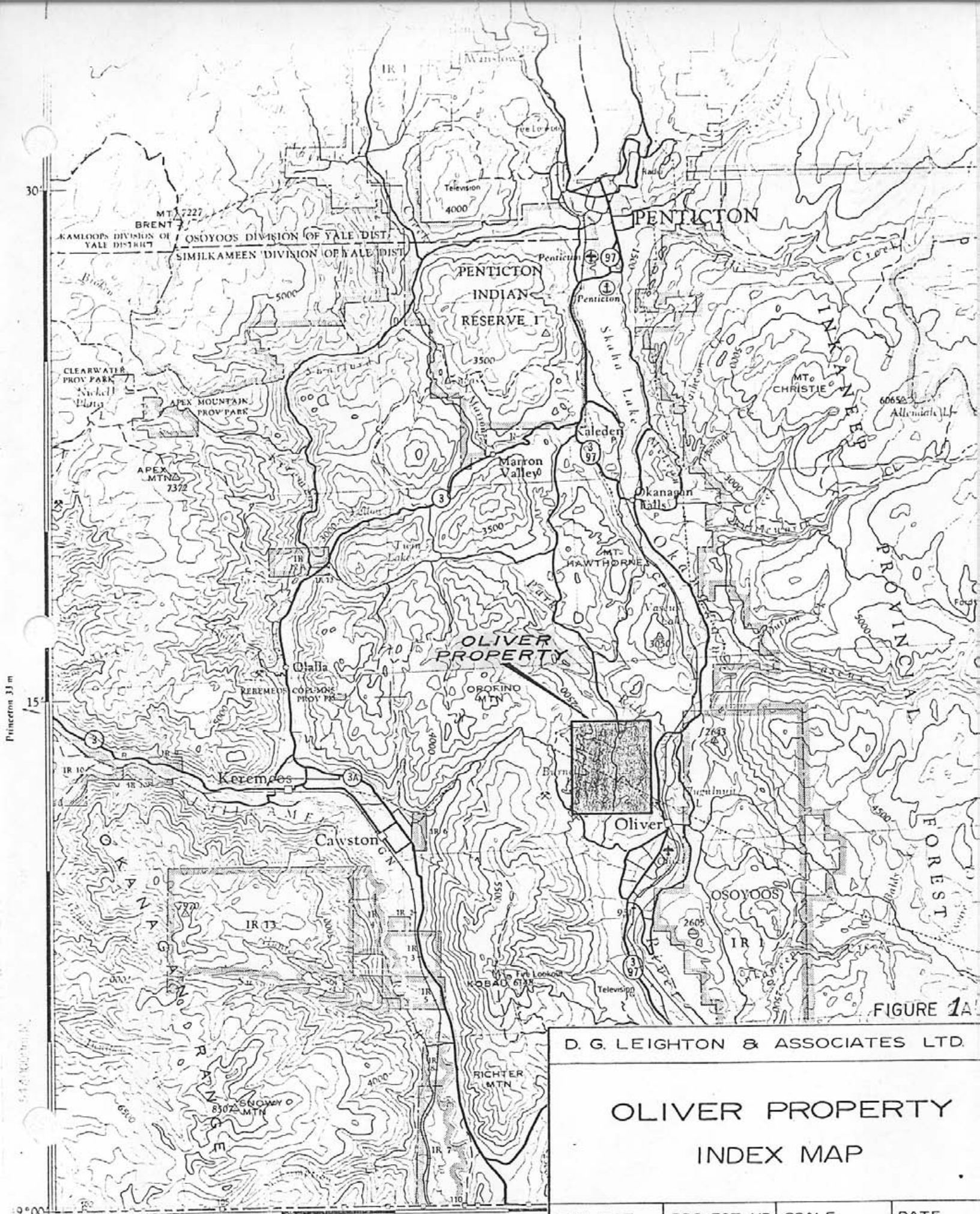

FIGURE 1A

D. G. LEIGHTON & ASSOCIATES LTD.

OLIVER PROPERTY

INDEX MAP

PROJECT	PROJECT NO.	SCALE	DATE
S. B.C. URANIUM	103	1: 250,000	AUG - 197

Property	Claims	Units	Record No.	Record Date
OLIVER	RKL-1	(18)	99 (7)	16 July, 1976
	POLVO	(18)	168(12)	1 Dec., 1976
	RKL-2	(20)	100 (7)	16 July, 1976
	SYN-2	(12)	140(10)	27 Oct., 1976
	SYN	(12)	139(10)	27 Oct., 1976
	OLI-1	(8)	274 (5)	18 May, 1977
	OLI-2	(15)	275 (5)	18 May, 1977

GEOLOGY

The OLIVER property is underlain mainly by granite of Cretaceous age - the Oliver Granite. This is a multiphase intrusion comprising granite and quartz monzonite with associated dykes. It is cut by large and small quartz veins.

The southern portion of the OLIVER property is underlain by Kobau Group meta-sediments.

The Oliver Granite is a highly fractured pluton which is evident from airphotos which show a high density of lineations. The granite is also cut by a number of lamprophyre dikes. The intersections of these dikes with major fractures are considered favourable sites for uranium mineralization. A good example is seen in the Oliver quartz quarry.

Concentrations of radioactive mineralization have also been found in marbles and quartzites in Kobau Group rocks near the granite contact; therefore the possibility of replacement type mineralization also exists.

GEOCHEMISTRY

General

The Oliver Granite is a high background two-mica granite with potential for economic concentrations of radioactive mineralization. Prospecting has resulted in the discovery of small patches with in excess of 100 ppm U_3O_8 in leached surface outcrops. Lake waters are highly anomalous in uranium in this area, containing in some instances several thousand ppb uranium with correspondingly high ppm levels in sediment. The most likely targets for primary mineralization are fault zones, especially near intersections with lamprophyre dikes. Such mineralization will be difficult to detect, due to deep leaching.

A geochemical soil survey covering various parts of the OLIVER property was completed in the Spring and Fall of 1977. This was reported in an assessment report by R.R. Culbert dated 30 October 1977.

GEOCHEMICAL SURVEY

General

This year eleven auger holes were "drilled" into unconsolidated sediments in the vicinity of the so-called "Sinking Pond & Flats" on the SYN mineral claims. The system employed involved a drive weight coring device with a split spoon sampler which permits the collection of uncontaminated cores to bedrock. Maximum depth sampled was 13 meters.

The area tested occurs in the bottom of a valley in granite. It is dry at present except for a small circular pond (Sinking Pond).

RESULTS

Results of the deep auger sampling are shown in Figure 3 following this page. Assays shown are for uranium averaged over 1/2 meter intervals. Approximate quantities of U_3O_8 estimated in a uraniferous layer are also indicated as "A" through "D" inclusive.

INTERPRETATION

Object of the program was to cubicate the amount of uranium involved in this portion of the lineament sediments and if possible establish a bedrock source which would be a diamond drill target for future work.

We calculate that the amount of anomalous uranium contained in overburden on the part of the SYN claim total exceeds 60,000 lbs. This must have concentrated since the last glacial stage about 10,000 years ago. Our analytical work (see Appendix "A") supports this interpretation since the uranium is present without daughter products and therefore must be very young indeed. The work to date does not indicate a probable source area which would coincide with a diamond drill target.

BREAKDOWN OF COSTS - For Assessment Purposes (approximate)

Wages and salaries*	$1,260.00	
Benefits @ 12%	151.00	$1,411.00
Meals and accommodation		
21 man days @ $30/man/day		630.00
Assay costs		
125 @ $6.00 each		750.00
Transportation - mainly truck rental		
One week @ $200/week		200.00
Drill-Auger rental		
One week @ $500/week		500.00
Miscellaneous; includes equipment rental,		
drafting - report preparation, etc.		250.00
TOTAL		$3,741.00

*See details on time sheet following this page.

PAY ROLL RECORD

	Project(s)	Code	Client(s)
1	S.B.C.U. - SYN	103	BRINEX
2			
3			
4			
5			

PAY PE

Name/Project	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Time Total	Rate	Amount	
R.J. BILQUIST		X	X	X																		X	X	X	X	X						7D	85.00	595	-
		Z	Z	Z																		Z	Z	Z	Z	Z									
L.O. ALLEN		X	X	X																		X	X	X	X	X						7D	50.00	350	-
		Z	Z	Z																		Z	Z	Z	Z	Z									
O.T. KENNING		X	X	X																		X	X	X	X	X						7D	50.00	350	-
		Z	Z	Z																		Z	Z	Z	Z	Z									

CLASSIFICATIONS

- A Airphoto Work
- B Budget
- C Compilation/Drafting
- D Drill Supervision
- E Expediting
- F Line Cutting/Surveys
- G Geological (Mapping)
- H Geochemical (Sampling)
- I Geophysical (Surveys)
- J Trenching
- K Cooking/Camp
- L Logging Core
- M Mobilization/Demobilization
- N General Supervision
- O Data Analysis
- P Prospecting
- Q Consultation
- R Research
- S Staking
- T Travel
- U Underground Surveys
- V Property Examination
- W Legal
- X Accounting
- Y Secretarial/Office
- Z DRILL-AUGER

TOTALS 1295 -

BENEFITS: includes; W.C., U.I.C. & Insurance 12 % Salary Total

REMARKS;

PREPARED BY: D. Laight

APPROVED:

CERTIFICATION

I, D.G. Leighton, do hereby certify that:

1. I am a professional geologist with offices at 3155 West 12th Avenue, Vancouver, B.C.

2. I am a graduate of the University of British Columbia, B.Sc. (1968).

3. I have practiced mining exploration work for eleven years, most of which was based in British Columbia.

4. I am a member (Fellow) in good standing of the Geological Association of Canada.

5. I have personally visited the OLIVER property and supervised exploration work carried out there.

Respectfully submitted,

D.G. Leighton, B.Sc.

D. G. LEIGHTON

17 November 1979

APPENDIX "A"

LEGS - LOW ENERGY GAMMA SPECTROMETRY

D.G. LEIGHTON & ASSOCIATES LTD.

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LOW ENERGY GAMMA SPECTROSCOPY (LEGS)

INTRODUCTION

Analysis of low energy gamma radiation provides a rapid and accurate method of assaying geological materials (silt, soil, rock, etc.) for uranium, thorium and the uranium daughter products radium and lead-214. As this is a relatively new technique, a brief technical description follows for persons interested in the development. This is not an advertisement for the process. D.G. Leighton & Associates Ltd. neither sell this equipment nor offer it as a regular service, except as part of their exploration programs. However, both input and questions from interested parties are welcome.

METHOD

The use of gamma radiation to assay uranium and thorium in geological materials has traditionally been limited by low count rates and by the need to measure a daughter product of uranium instead of uranium itself. Disequilibrium between uranium and its daughters is the rule rather than the exception, especially in sediments or weathered rock.

In order to be useful in exploration geochemistry, an assay technique must be able to measure uranium directly, and quickly. Although the decay sequence of uranium is very complex it may spectrographically be thought of as 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}. All radiation from the brief 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 starte 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 emissions.

Two other radioactive components must be considered. The first of these is thorium, which is generally considered to have a single, 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 at hand.

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			

AN EQUILIBRIUM URANIUM GAMMA SPECTRUM

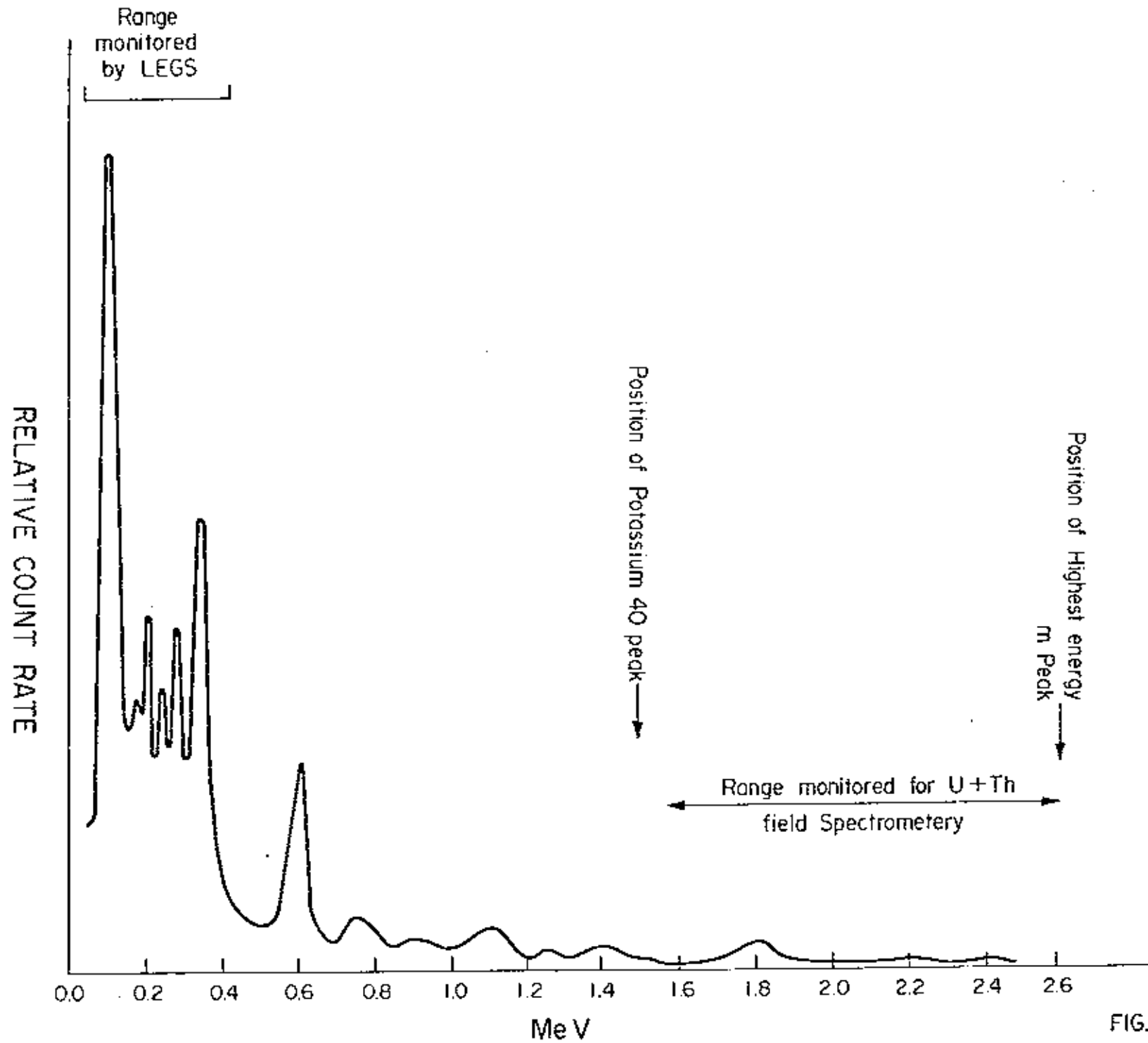


FIG.

In order to be useful in geochemical analysis, a gamma spectrometry technique must employ a portion of the gamma spectrum which fulfills three criteria:

1. The count rate must be sufficiently high to obtain good statistics from a few grams of sample in a reasonably short time.

2. Each of the forementioned radioactive components must have either negligible radiation in the energy region, or be sufficiently strongly present to be separately measured.

3. The radiation patterns of the components must be clearly separable.

Traditionally gamma spectrometry in exploration uses the highest portion of the natural gamma energy range. This isolates and separates three components, namely potassium, thorium and a Bi^{214} decay of the third part of the uranium decay sequence (Figure 1). It does not, however, measure uranium itself. Furthermore, the actual count rate in this vicinity is very low as Figure 1 shows.

The gamma energy interval between 0.05 and 0.5 MEV meets all three of the foregoing criteria. This approach is not available to field surveys because of the very high background gamma flux (due largely to cosmic radiation), but lead shielding provides good protection at these low energy levels. Low energy gamma spectrometry is hence a laboratory or field base method, involving a lead-shielded "center-well" scintillating crystal and a pulse height analyser capable of integrating counts across preset segments of the gamma spectrum. All are "off the shelf" items and the total cost is approximately $14,000.

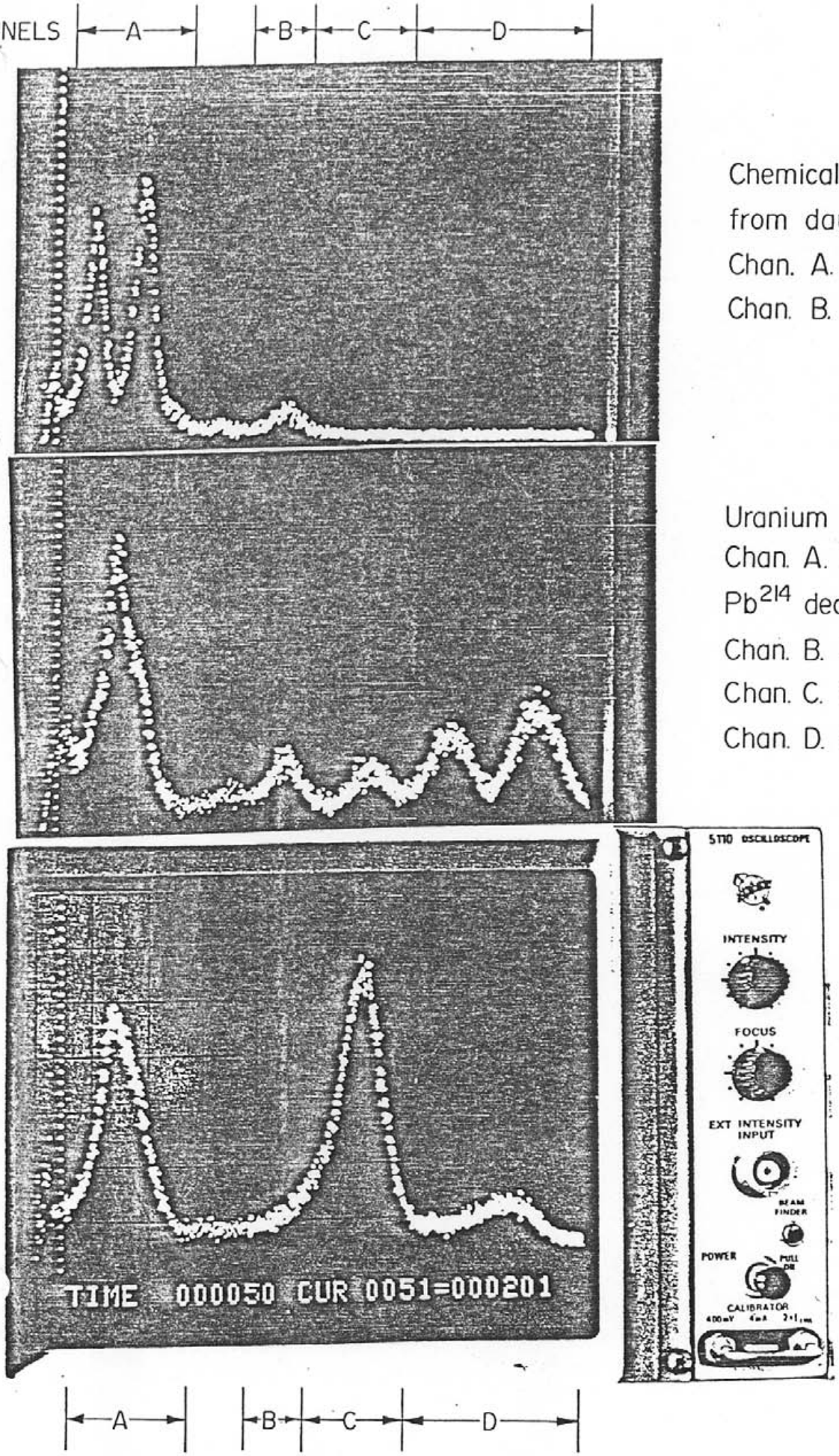
Figure 3 shows the spectrums of the three components of uranium radiation and thorium as viewed on the pulse height analyser. It also demonstrates how the spectrum is broken into four channels across which the counts are automatically integrated. Calculation of uranium, thorium, radium and Pb^{214} is then made by a programable desk calculator. The mathematics are not difficult, and intuitively it may be seen that when the components to be measured have patterns as strong and as distinctly different as those of Figure 3, they may be clearly separated and accurately determined.

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 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" neutron activation analysis is as good as is routinely available, in our opinion.

Figure 6 shows the fit of low energy gamma spectrometry measurements to the standards on which it is calibrated. These include G.S.C. standard rocks, laboratory chemical standards, and mixtures thereof. The results are precise within the limitations of the balance used for weighing, showing that the technique itself has good accuracy. These calibration curves are based on counting times of greater than two hours, however, and generally

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 analyse

FIG. 3

COMPARISON OF DUPLICATE ANALYSES FOR URANIUM BETWEEN TWO LABORATORIES

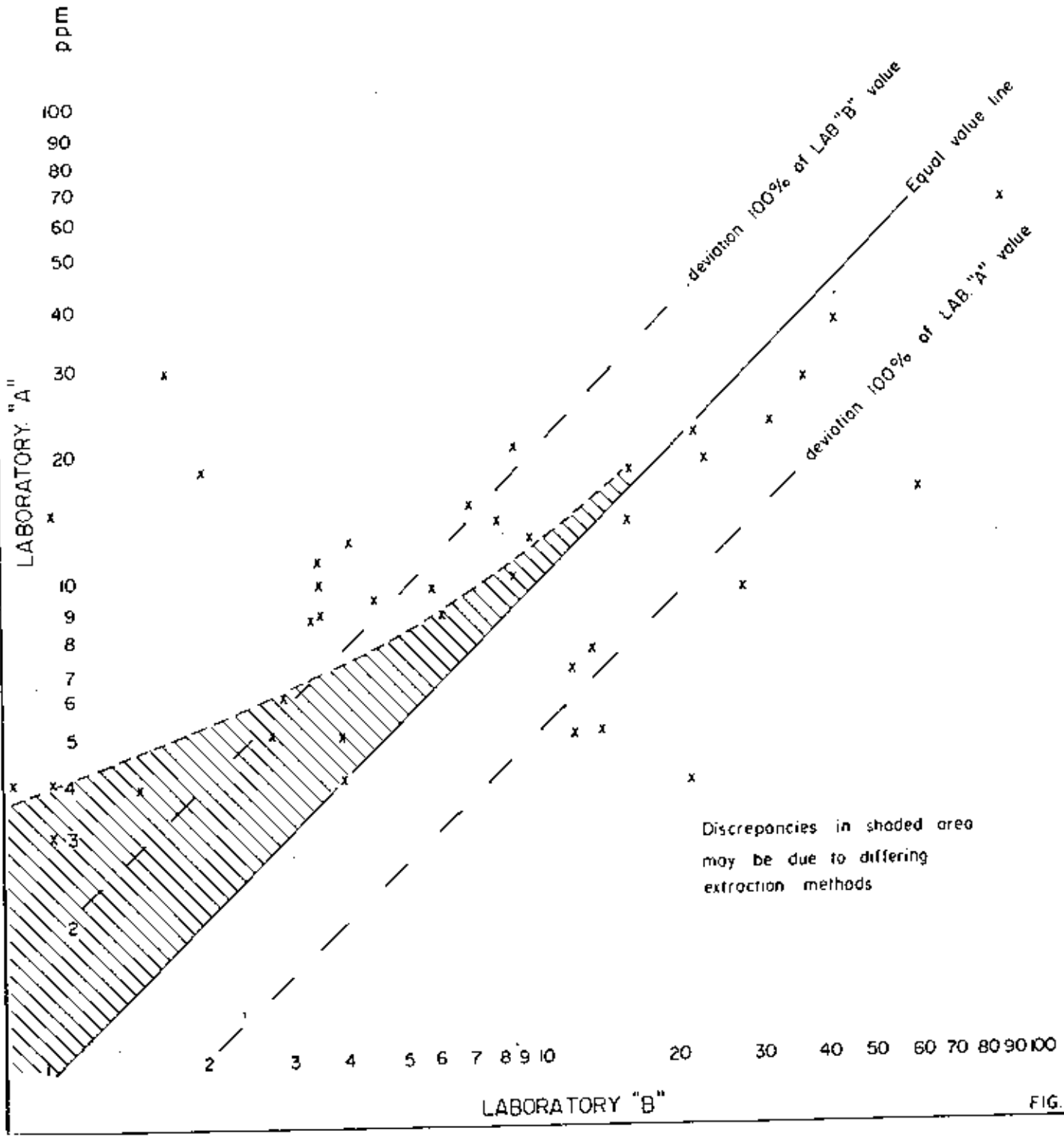


FIG. 4

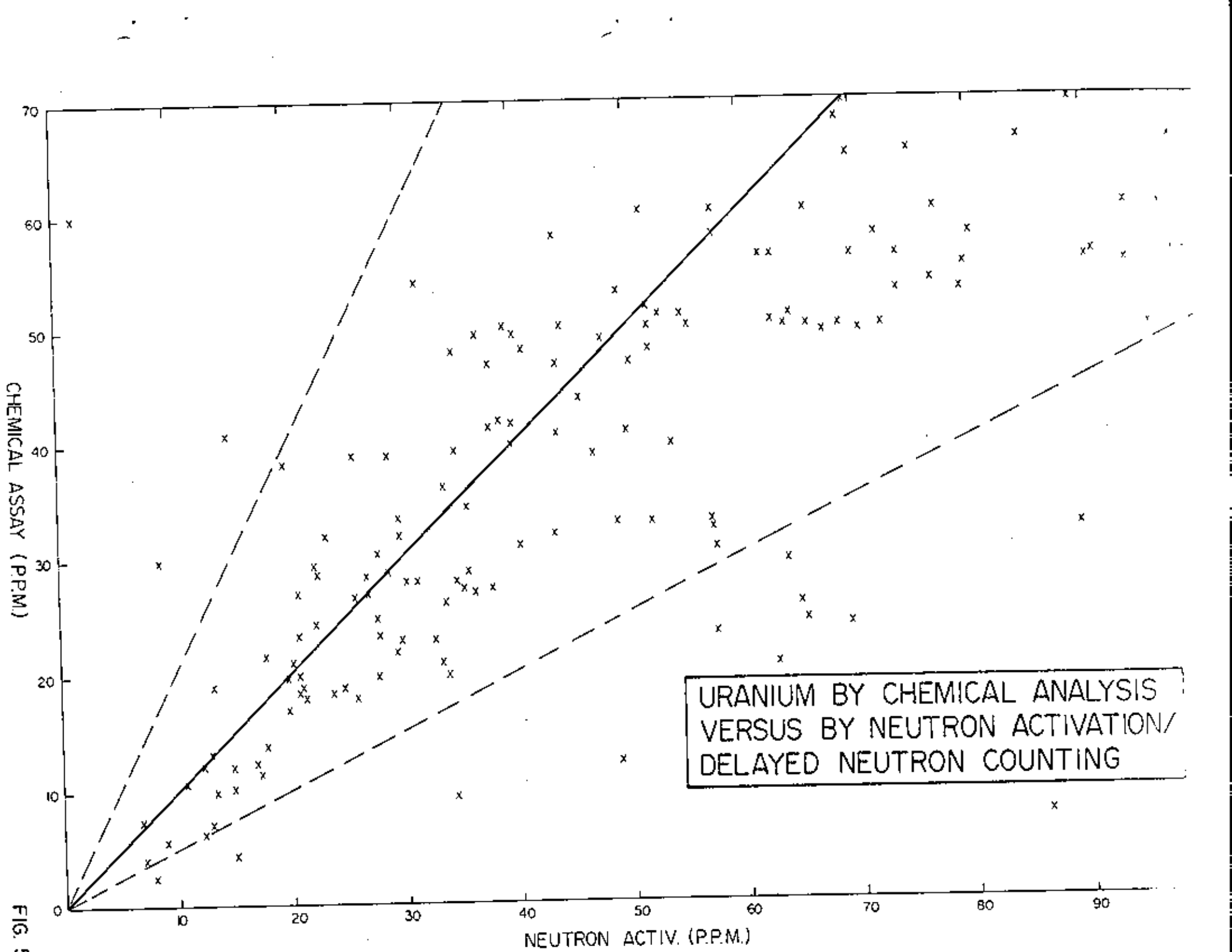

URANIUM BY CHEMICAL ANALYSIS
VERSUS BY NEUTRON ACTIVATION/
DELAYED NEUTRON COUNTING
CHEMICAL ASSAY (P.P.M.)
NEUTRON ACTIV. (P.P.M.)
0
10
20
30
40
50
60
70
80
90

FIG.

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

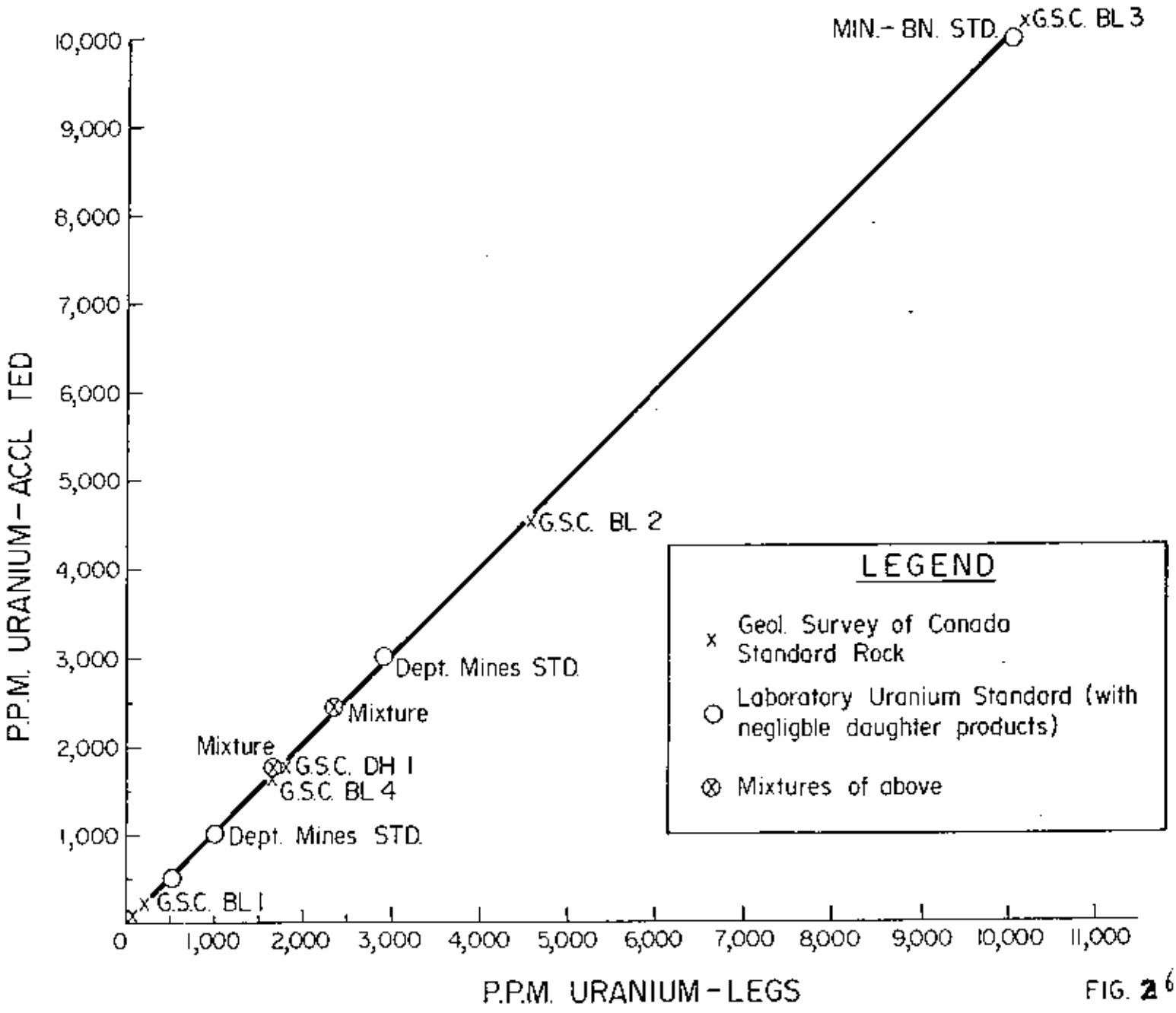


FIG. 2

standards relatively rich in radioactive elements. Precision during ordinary analysis will be substantially lower.

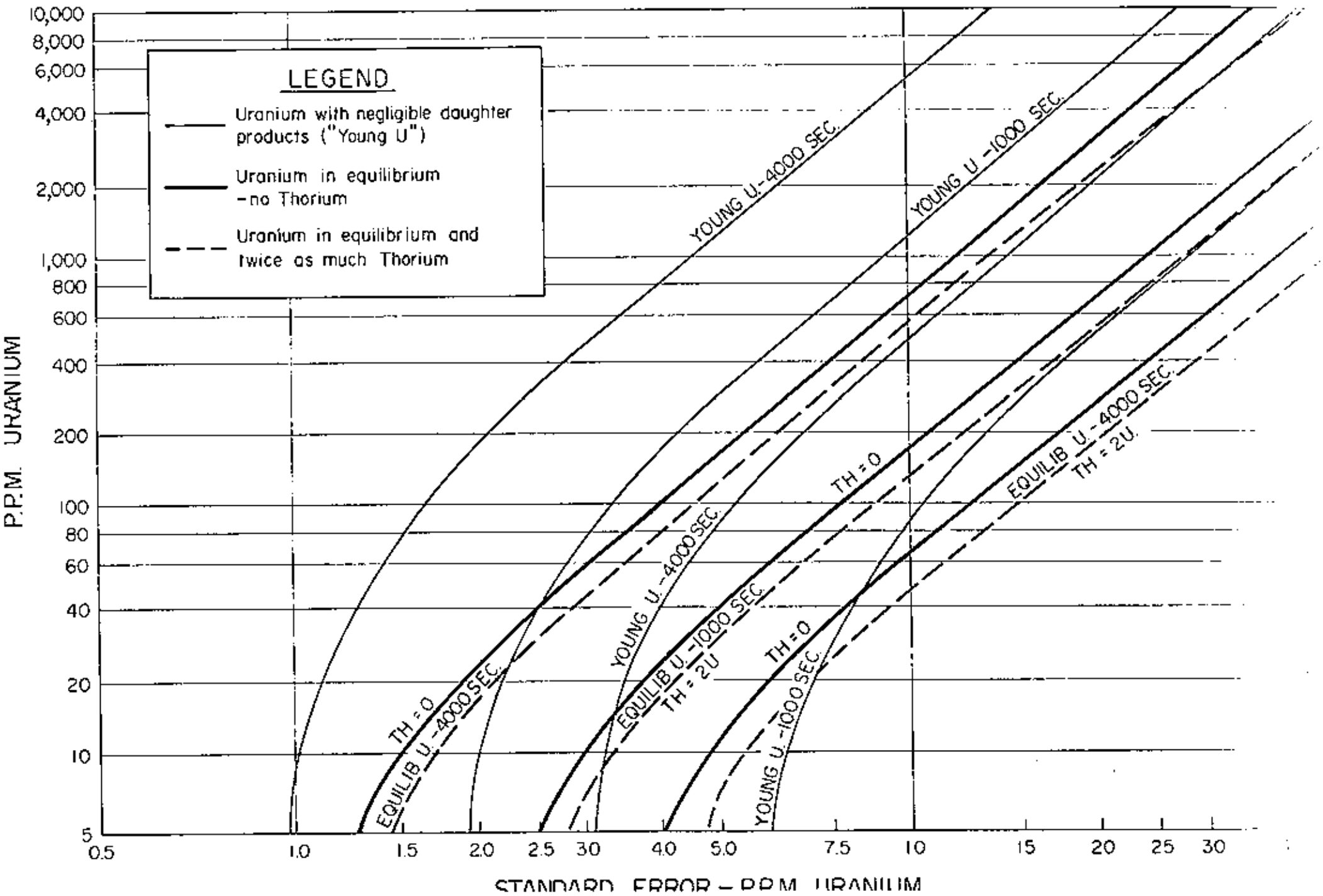
In statistical theory, the standard error (expected standard deviation) of a number produced by counting events is very close to the square root of that number. In practice, this is the controlling factor in precision for routine analysis by the LEGS technique, with other factors such as sample reloading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

TECHNIQUE 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 signifcant 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.

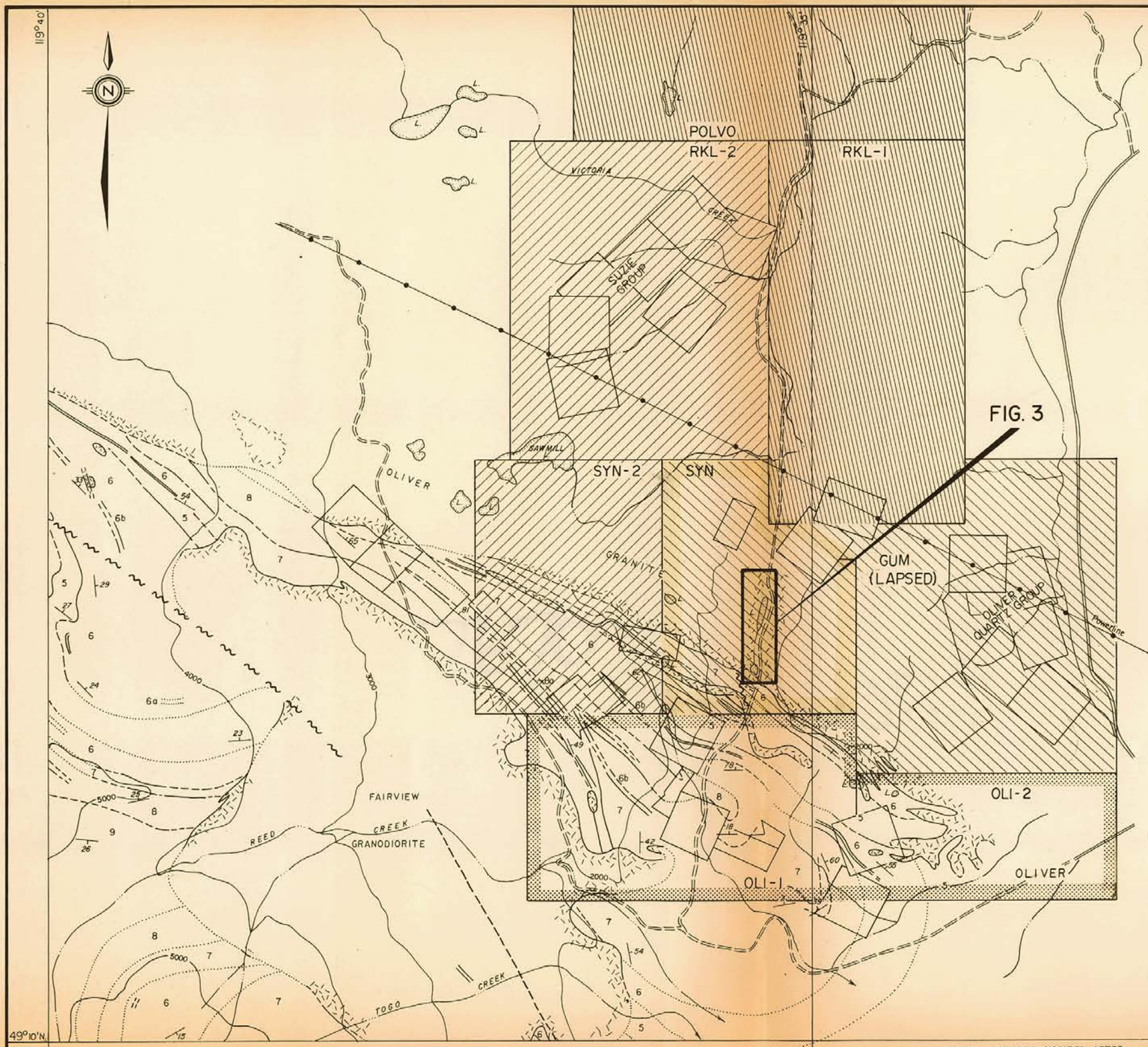
2. The very heavy elements tend to absorb radiation in the lowest energy channel. Where high uranium or thorium contents are involved, an interval correction for this effect is easily made. The only element likely to be a problem, therefore, is lead, with which 1,000 ppm gives

STANDARD ERROR FOR URANIUM IN LEGS DETERMINATION



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.



NOTE: GEOLOGY MODIFIED AFTER A.V. OKULITCH (1969)

LEGEND

- Diorite, Granodiorite, Qtz Monzonite, Qtz latite
- 9 — Foliated quartzite
- 8 / 8a / 8 — Chloritic, actinolitic phyllite 8a – quartzite
- 7 — Foliated phyllitic quartzite
- 6 a b c — Chloritic, actinolitic phyllite & schist; 6a = marble, 6b = schist, 6c = quartzite
- 5 — Massive quartzite
- Lithologic contacts – observed, approx., assumed
- Foliation – inclined
- Fault – observed, assumed
- Lineaments
- OLIVER – NORTH
- OLIVER – WEST
- OLIVER – EAST
- OLIVER – SOUTH

FIGURE 2

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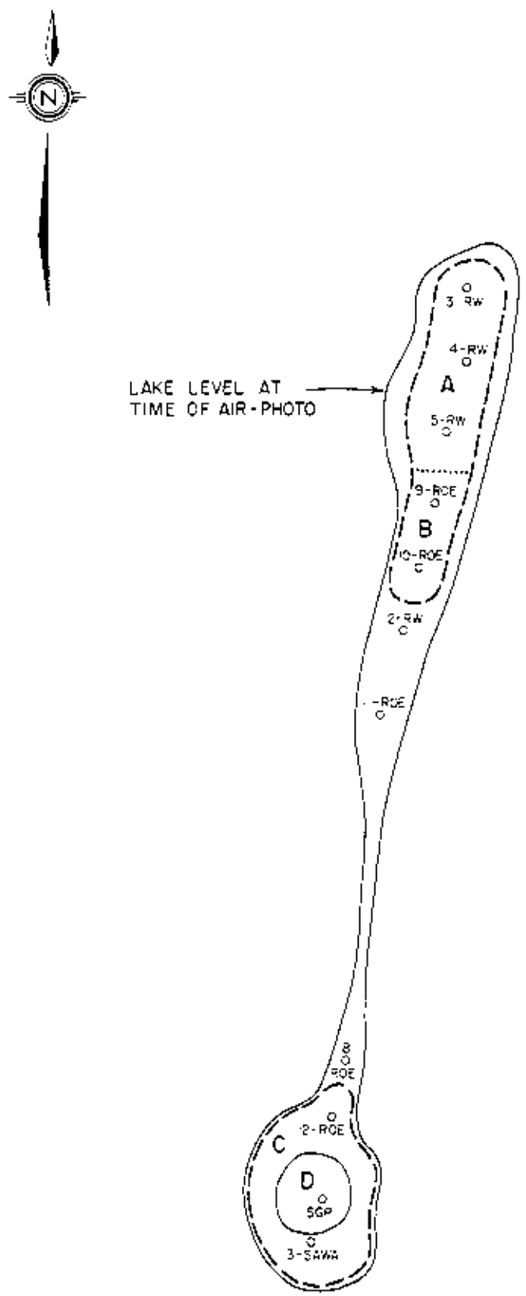
OLIVER PROPERTY
SOUTHERN B.C. URANIUM PROJECT

CLAIM GROUPING

PROJECT No.	PROJECT	SCALE	DATE
103	S. B.C. U.	1" = 1/2 mile	AUG. 1977



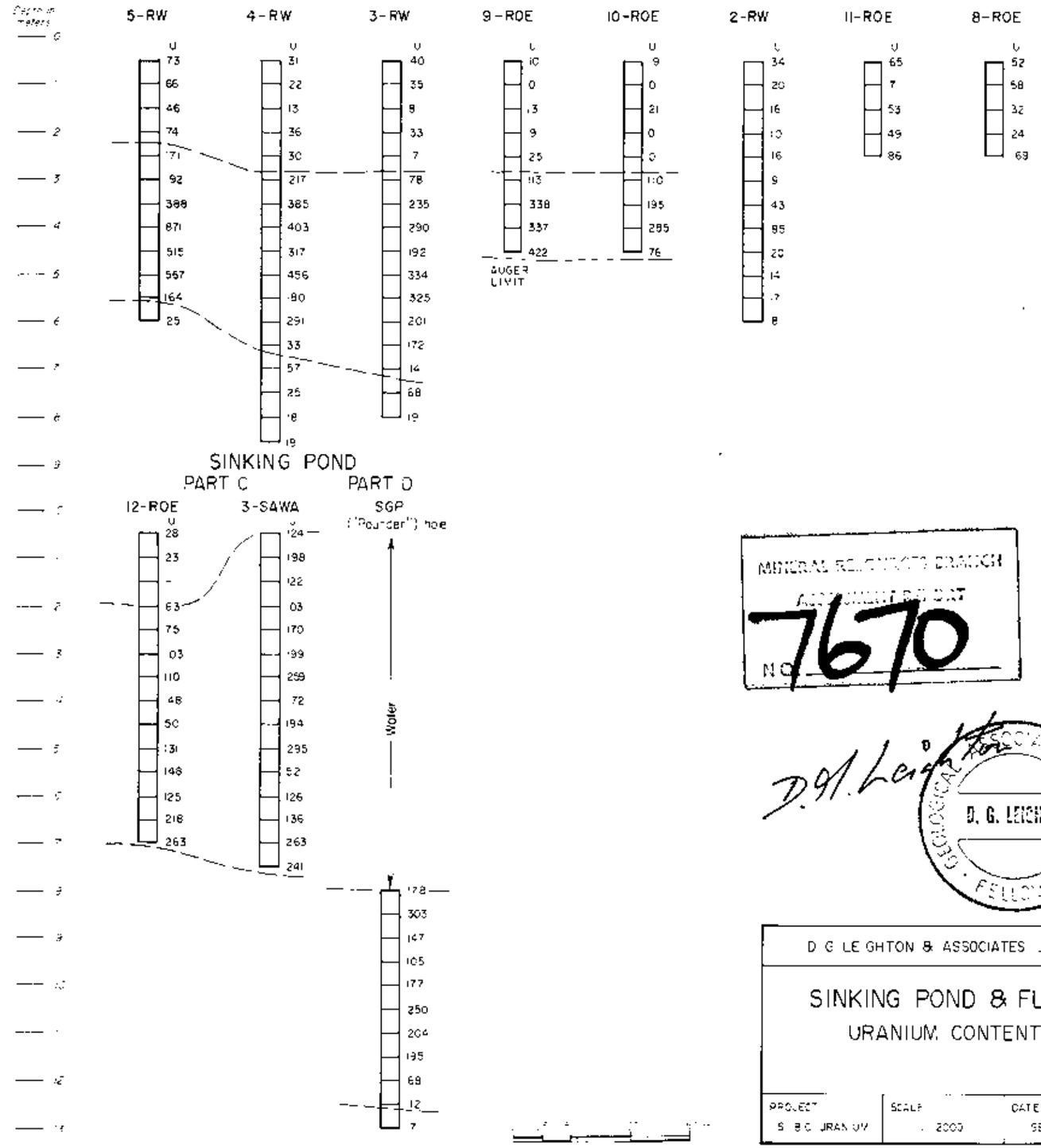
A. Area 7700 m²
Av layer 4.0 m
Av conc 308 ppm
Edge loss 7400 m³
Density 1.6
U_3O_8 est 30,000 lbs
lbs/m² 3.9

B. Area 3200 m²
Av layer 2.0 m
Av conc 235 ppm
Edge loss 900 m³
Density 1.6
U_3O_8 est 5,300 lbs
lbs/m² 1.7

C. Area (excluding Lake) 4000 m²
Av layer 6.5 m
Av conc 161 ppm
Density 1.6
U_3O_8 est. 17,400 lbs
lbs/m² 4.4

D. Area 2000 m²
Av layer 5.0 m
Av conc 74 ppm
Density 1.6
U_3O_8 est 7,300 lbs
lbs/m² 3.6

SINKING FLATS



D. G. Leighton

FIG 3

D G LEIGHTON & ASSOCIATES LTD.

SINKING POND & FLATS
URANIUM CONTENT

PROJECT	SCALE	DATE
S B C URANIUM	1:200	SEPT 1979