017028 Pb Isotope Study

(1) Dy fingerprinting to complement S isotope study 206/204 ↑

(2) Pb in deposits
Sea/SB to Faro

(3) Pb in Anvil Batholith
- P. Le Couteur

(4) Pb in kspar / strat. py.

(1) Samples of all deposits

Faro - done LeCounteur

Grum ← 7 samples Godwin

Vangorda - done LeCounteur

Swim 4 samples LeCounteur

DY ← From Blundell

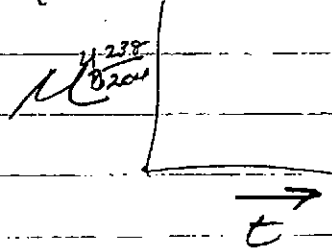
SB ←

Sea 1979 2 samples LeCounteur

Firth ←

Check "representativity" of LeCounteur Ce samples map per deposit

(2) U/Th Samples



A) Dating
i) Stratiform ⟹ Rb/Sr possible LCP/
ii) Vein —

B) Correlation
i) Stratiform Pbs 206/204 variation
~~to complement S study~~
(# of samples argument)
ii) Feldspar Pb – probs
iii) Pb in strat. py.

C) Brine Study
i) Whole rk "halo" Geochem around deposits
ii) Feeder
iii) GAS liasons

Barry Ryan
228-5703
Ian Duncan
228
Geol.
w/ Mortensen

13/6/79

Intermediate Results

Dear Dave

This is as far as I've got with the Rye Hop samples for the moment, I intend preparing and running about 5 more then we can all sit down and see if it means anything. At the moment it doesn't appear that it may be possible to fingerprint the horizons based on about 4 analyses / horizon. If this is the case then it would be very useful! - we will have to wait & see if it proves out.

I also include Pb's data for Anvil deposits + my Grun data. (all numbers normalized to some value for Broken Hill standard)

I haven't got down and really thought about the data yet but will probably in Sept as it looks as if it will be a busy summer.

Any way some things to keep in mind when comparing the various deposits and horizons.

energy from anywhere?

Pb from volcanogenic ⟷ (mixture) ⟷ Pb from shales

	source lower	source higher
$\mu \left(\frac{U^{238}}{Pb_{204}}\right)$		
$Pb^{206}/_{204}$	"	"
$Pb^{208}/_{204}$	higher	lower
model age	older	younger

that would be my prejudice anyway

hope feed the flys

Cheers Barry

P.S. I'll be consulting part of July and on holiday part of Aug

Hi Jim We started on the MM samples at last and will push them through soon.

Mary

Anvil Range Yukon

Number of analyses		Values all normalized to same values for Broken Hill (16.003 15.327 35.657)		
(7)	Faro Main *	18.367 (.0053)	15.667 (.0027)	38.350 (.012)
(3)	Faro No2 *	18.374 (.022)	15.677 (.0066)	38.365 (.044)
(5)	Vangorda *	~~18.354~~ 18.359 (.0032)	15.667 (.0026)	38.301 (.022)
(3)	Swim *	18.390 (.002)	15.665 (.002)	38.293 (.0075)
(2)	Sam *	18.355 (.13)	15.652 (.017)	38.390 (.16)
(7)	Grum	18.404 (.013)	15.653 (.011)	38.373 (.046)
(12)	Dye	18.409 (.0079)	15.669 (.0067)	38.402 (.029)

Faro M	2.038
Faro No2	2.038
Vangorda	2.037
Swim	2.038
Sam	2.037
Grum	2.085
Dye	2.036

* Peter LeCouteur Thesis

Dye deposit upper values obtained
lower values normalized

(13) Dye	18.4216 (.0079)	15.669 (.00069)	38.389 (.024)
	18.409 ( )	15.650 ( )	38.402 ( )
DDH 77-X-11	18.400 (.0086)	15.643 (.034)	38.377 (.16)
(3) Horizon 4	18.387	15.624	38.390
1'	18.407 (.017)	15.706 (.0025)	38.401 (.005)
(2) Horizon 3	18.394	15.687	38.414
	18.437 (.006)	15.661 (.033)	38.371 (.028)
(1) Horizon 2 Lower	18.424	15.642	38.384
DDH 78-X-11			
	18.370 (.029)	15.658 (.026)	38.306 (.044)
(2) Horizon 4	18.357	15.639	38.319
	18.454 (.016)	15.687 (.0073)	38.502 (.031)
(3) Horizon 3	18.441	15.668	38.515
(3) Horizon 2 Upper	18.417 (.001)	15.654 (.019)	38.313 (.067)
	18404	15.635	38.326
(4) Horizon 2 Lower	18.438 (.017)	15.672 (.003)	38.410 (.036)
	18425	15.653	38423

↑
1F

	μ	ϵ single stage approximate
Faro main	9.985	331
No 2	10.03	346
Vangorda	9938	340
Swim	9.983	347
Sea	9.921	310
Grum	9.912	276
Dye	9.982	304

Drill Holes

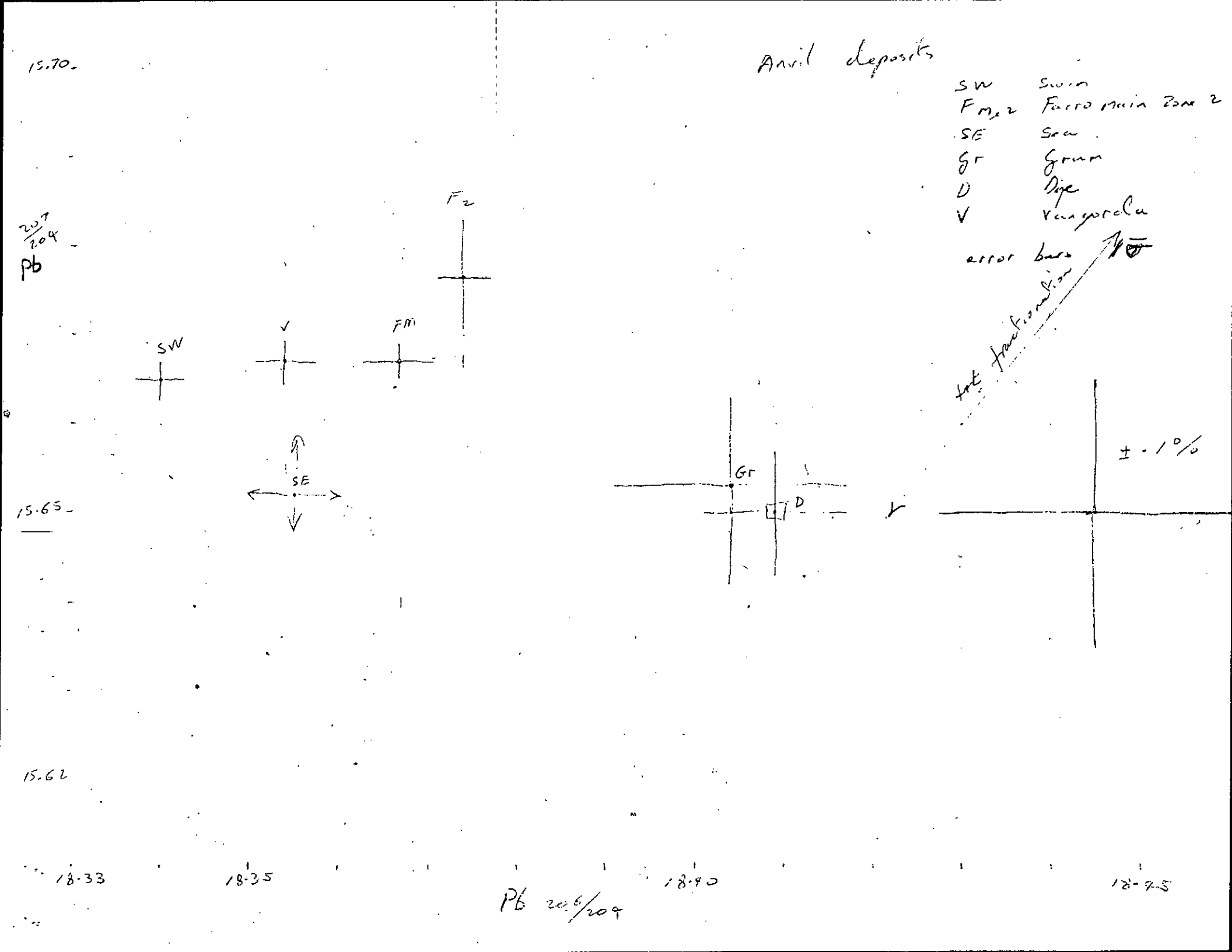
horizon	(A) μ	(A) ϵ	(B) μ	(B) ϵ
4	9.788	229	9.862	282
3	10.067	351	9.969	279
2L	9.859	238	9.907	260
2U			9.833	239

see one fractionation lines are drawn most likely error spreads along these lines individual sample analyses precision $< .1\%$ reproducibility $< .15\%$

15.70

Anvil deposits

SW Sw.m
$F_{m,2}$ Ferro main Zone 2
SE Se.m
Gr Granm
D Dike
V Vanguard



207/204 Pb

15.65

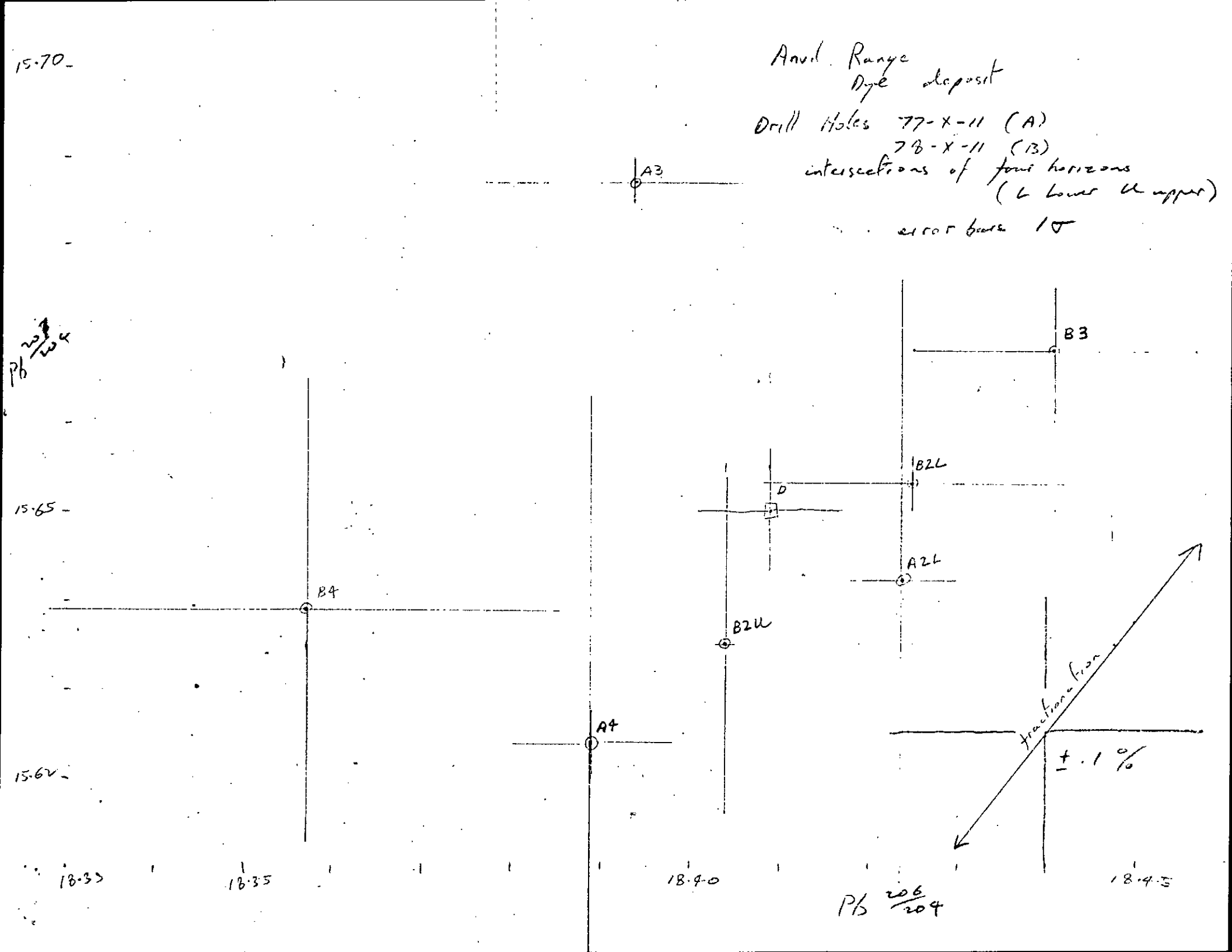
15.62

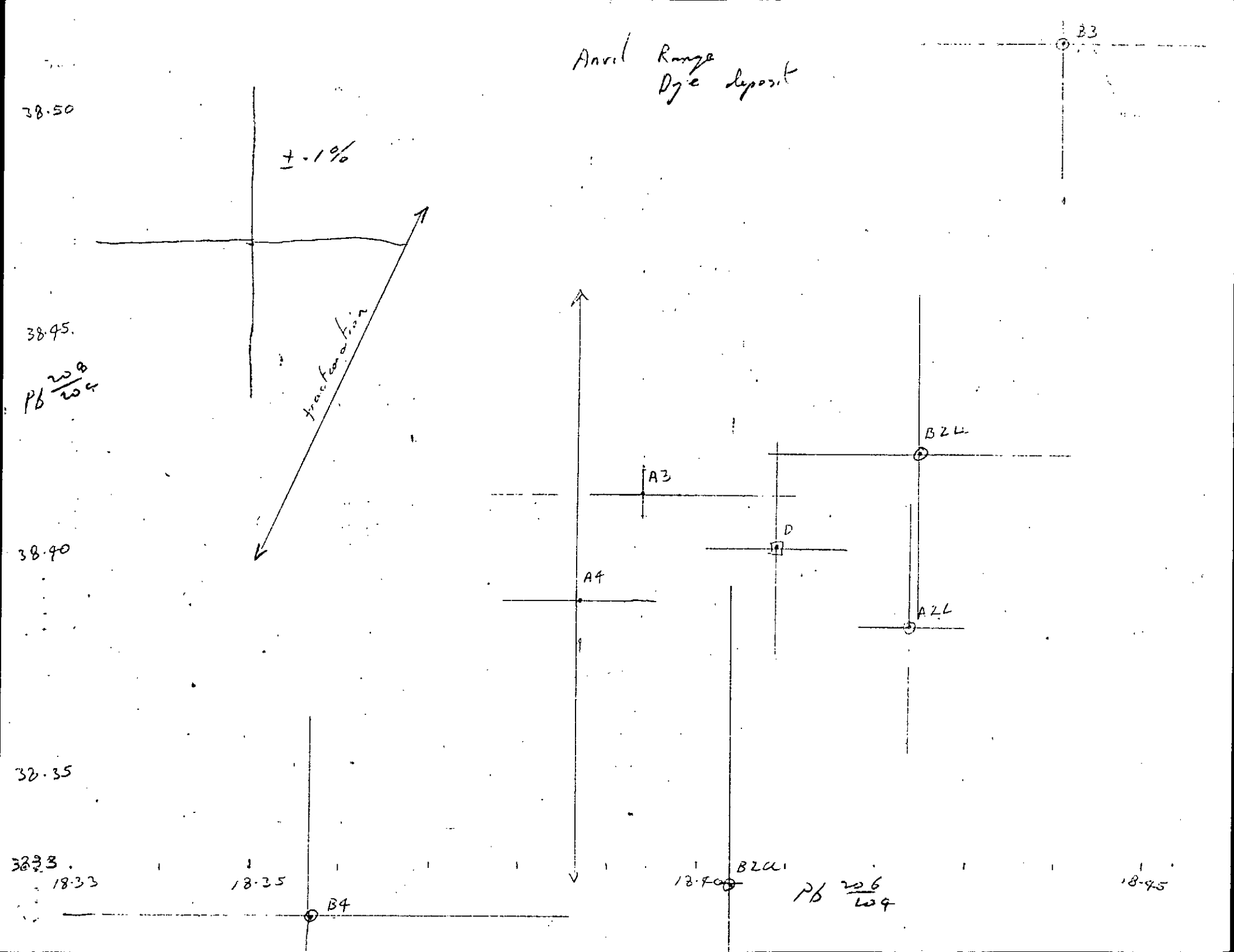
18.33 18.35 18.40 18.45

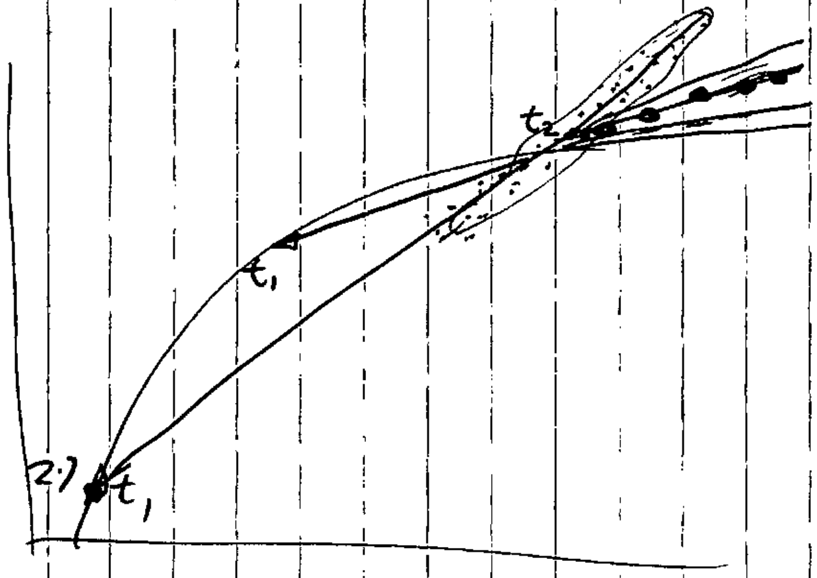
Pb 206/204

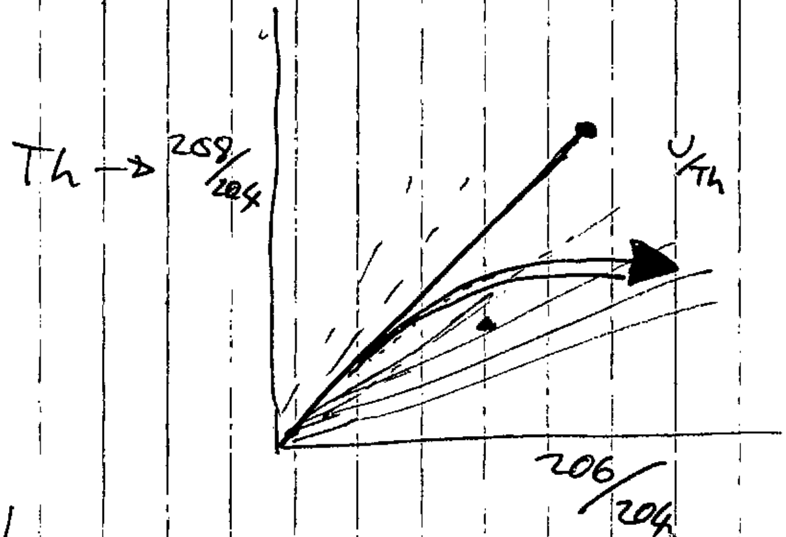
Anvil Range
Dye deposit

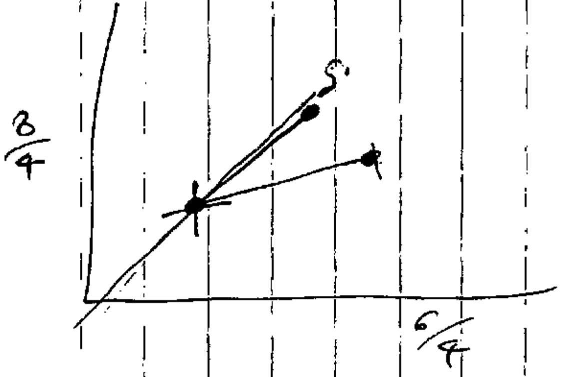
Drill Holes 77-X-11 (A)
78-X-11 (B)
intersections of four horizons
(L Lower U upper)
error bars 1σ




Anvil Range
Dyke deposit
B3
38.50
±.1%
38.45
transformation
Pb 208/204
B2L
A3
D
38.40
A4
A2L
32.35
B2a
B4
18.33
18.35
18.40
18.45
Pb 206/204

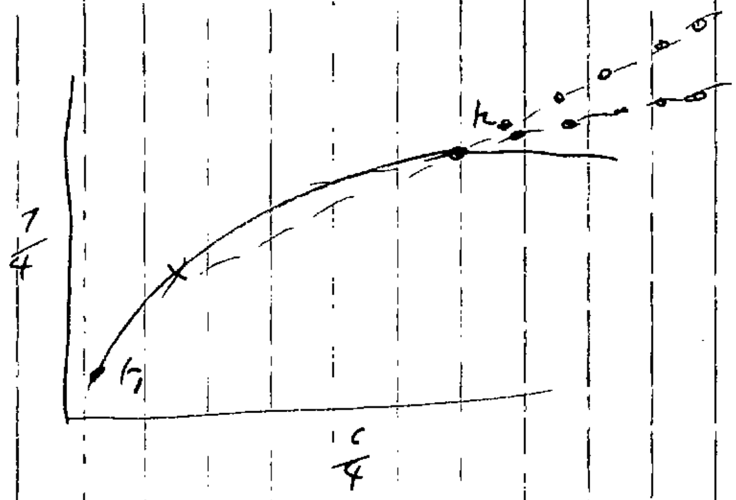


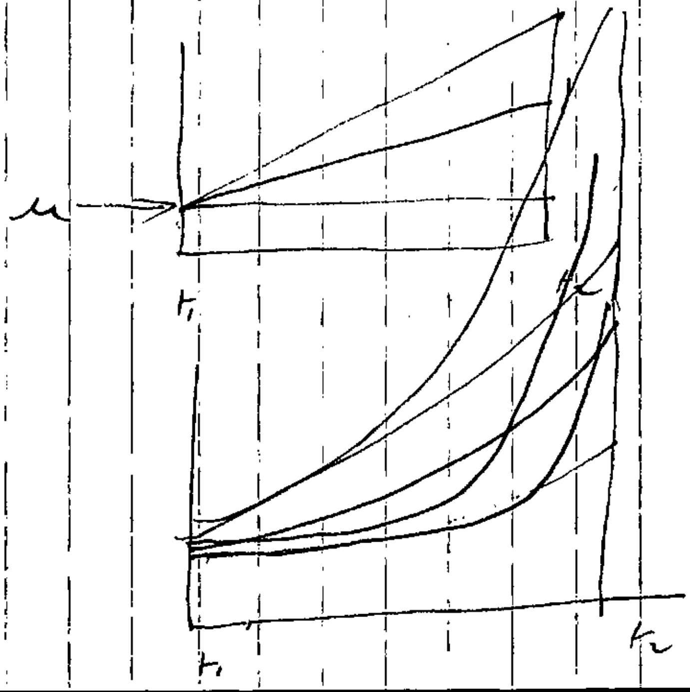


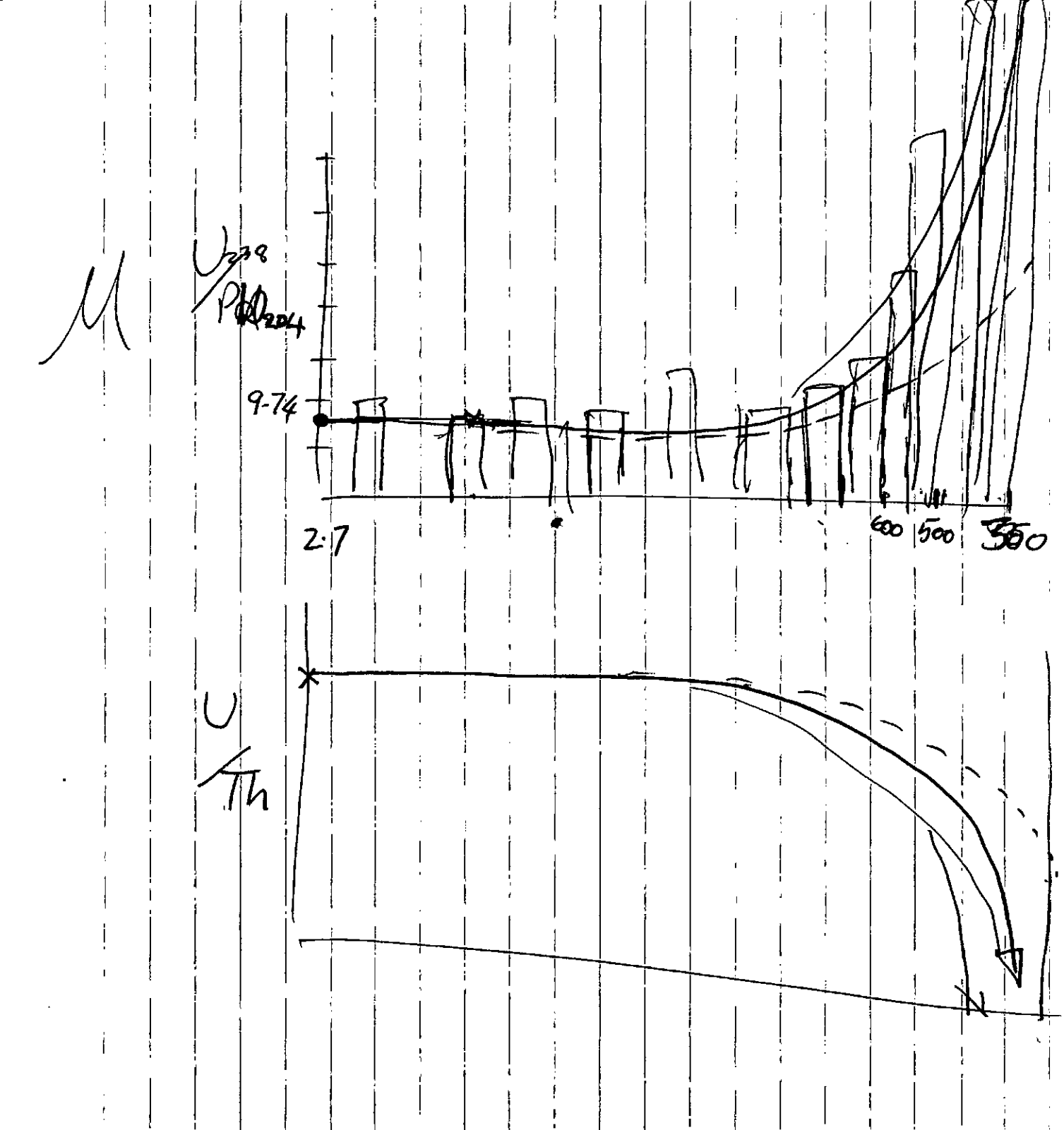


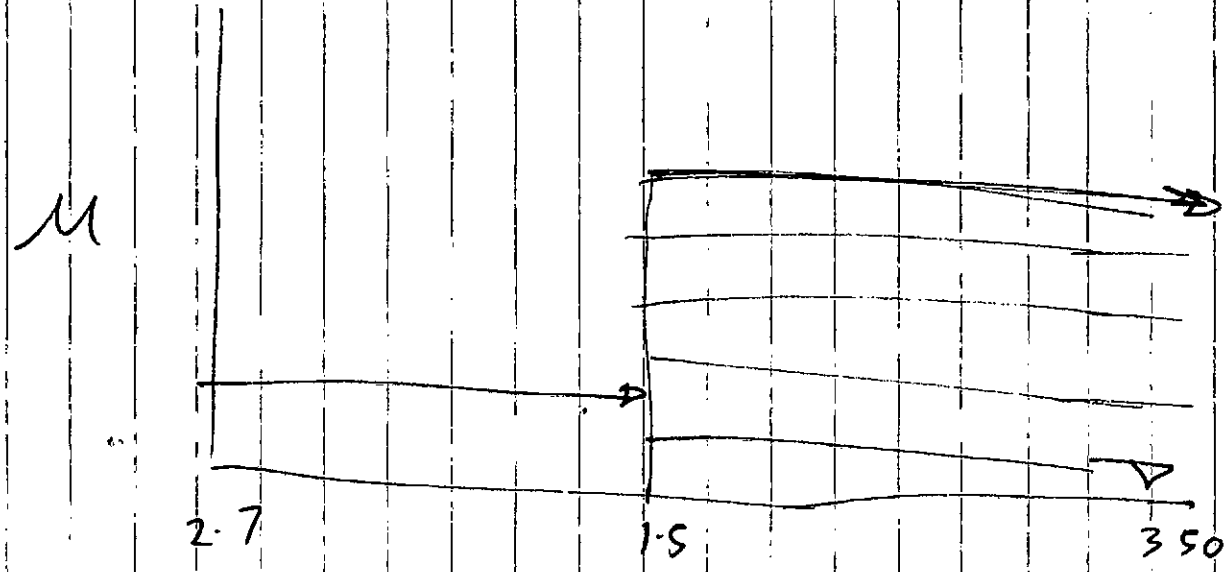
Th/U

κe^{μ}



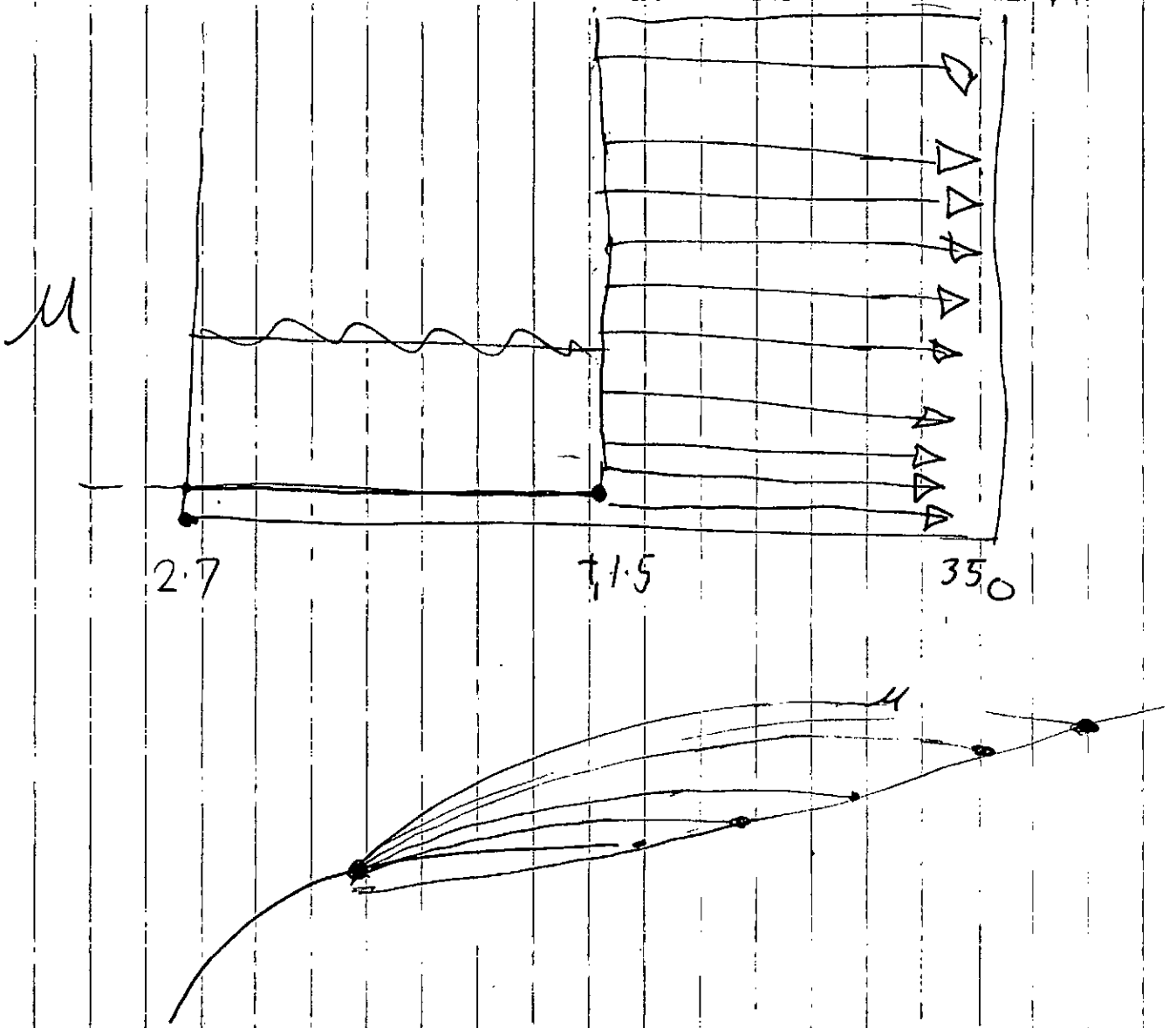


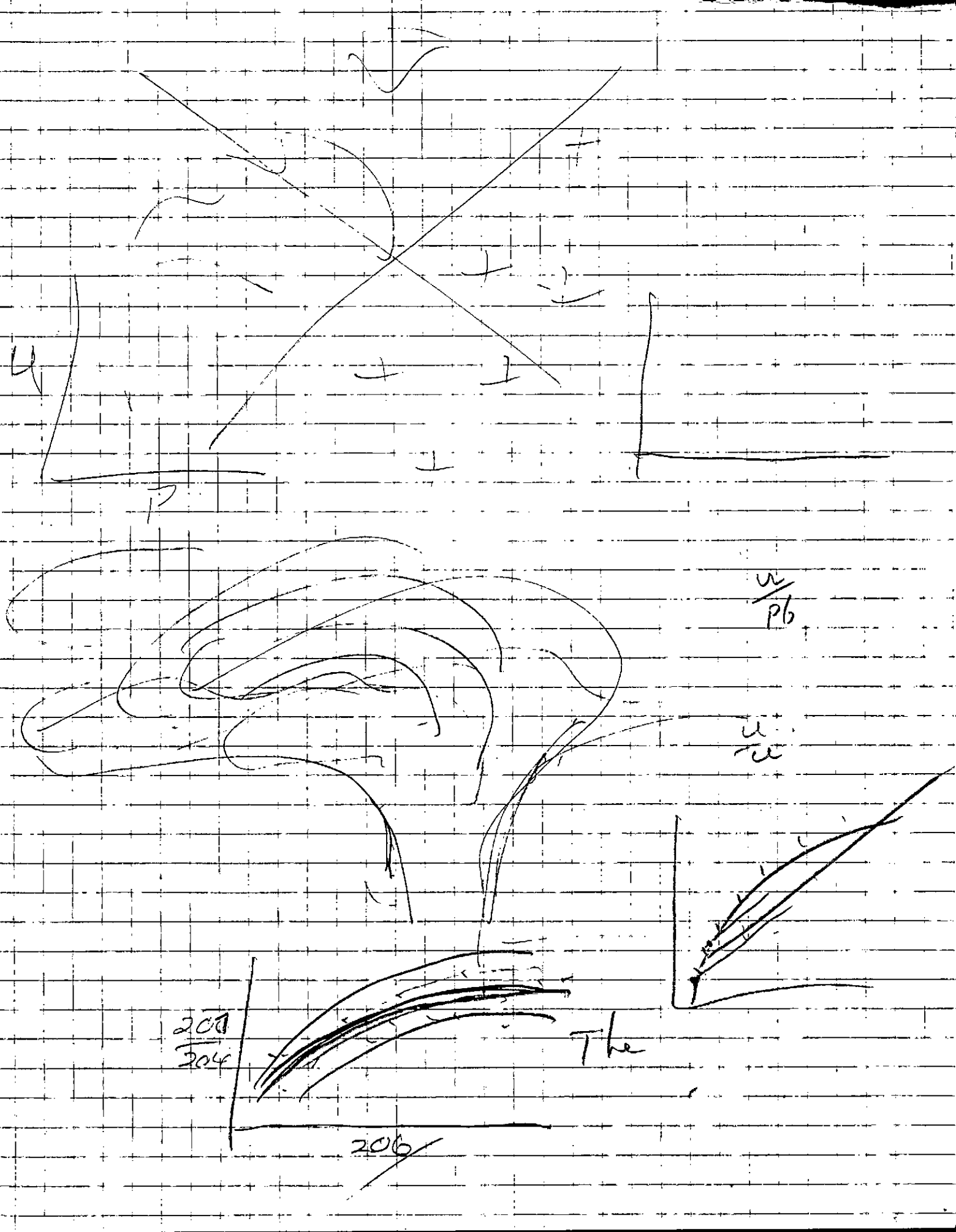

U_{238}
Pb_{204}
9·74
2·7
600
500
300
U
Th



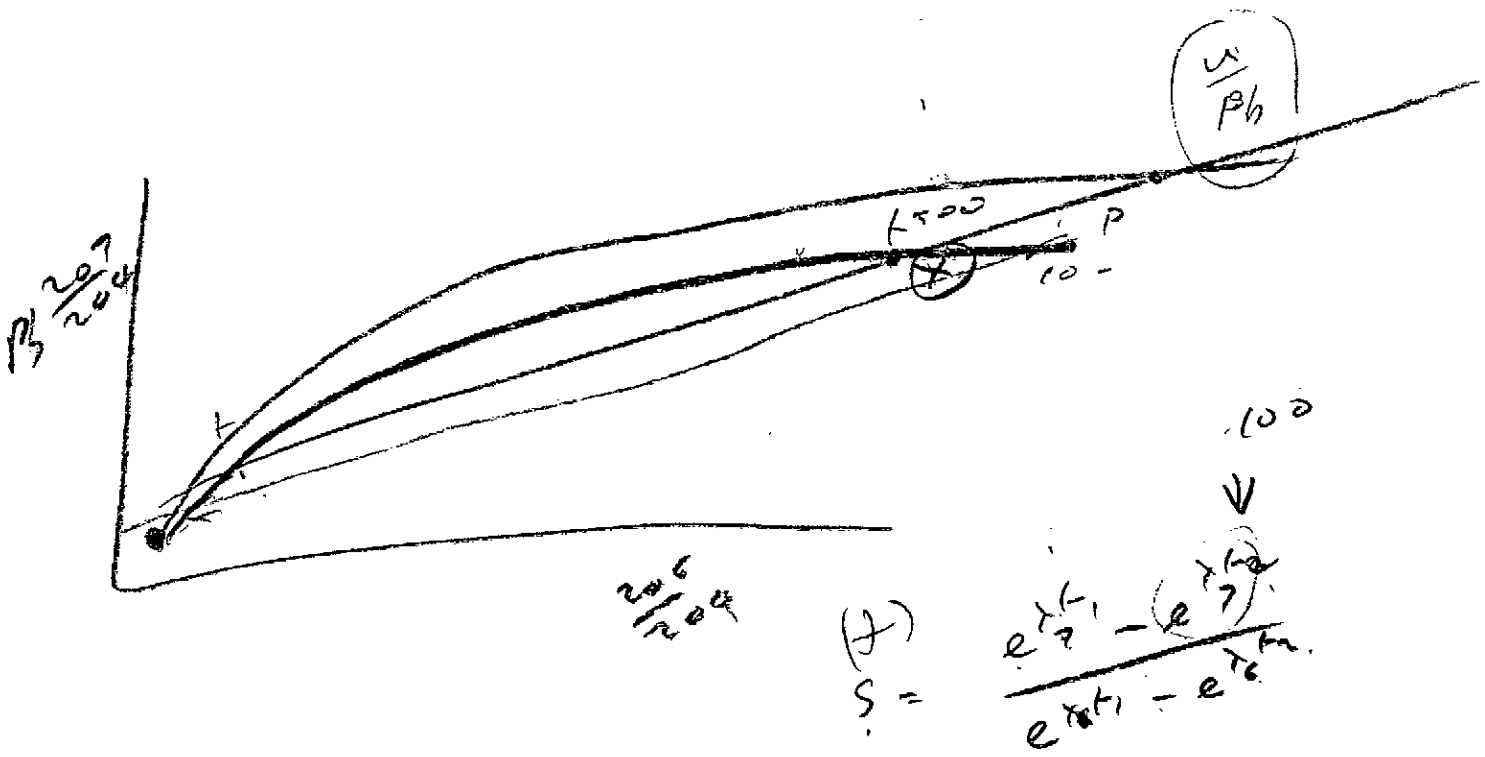
$$\left.\frac{Pb^{206}}{Pb^{204}}\right|_{t_{final}} = \frac{Pb^{206}}{Pb^{204}}_{t_1} + \mu\left(e^{\lambda t_1} + e^{\lambda t_2}\right)$$

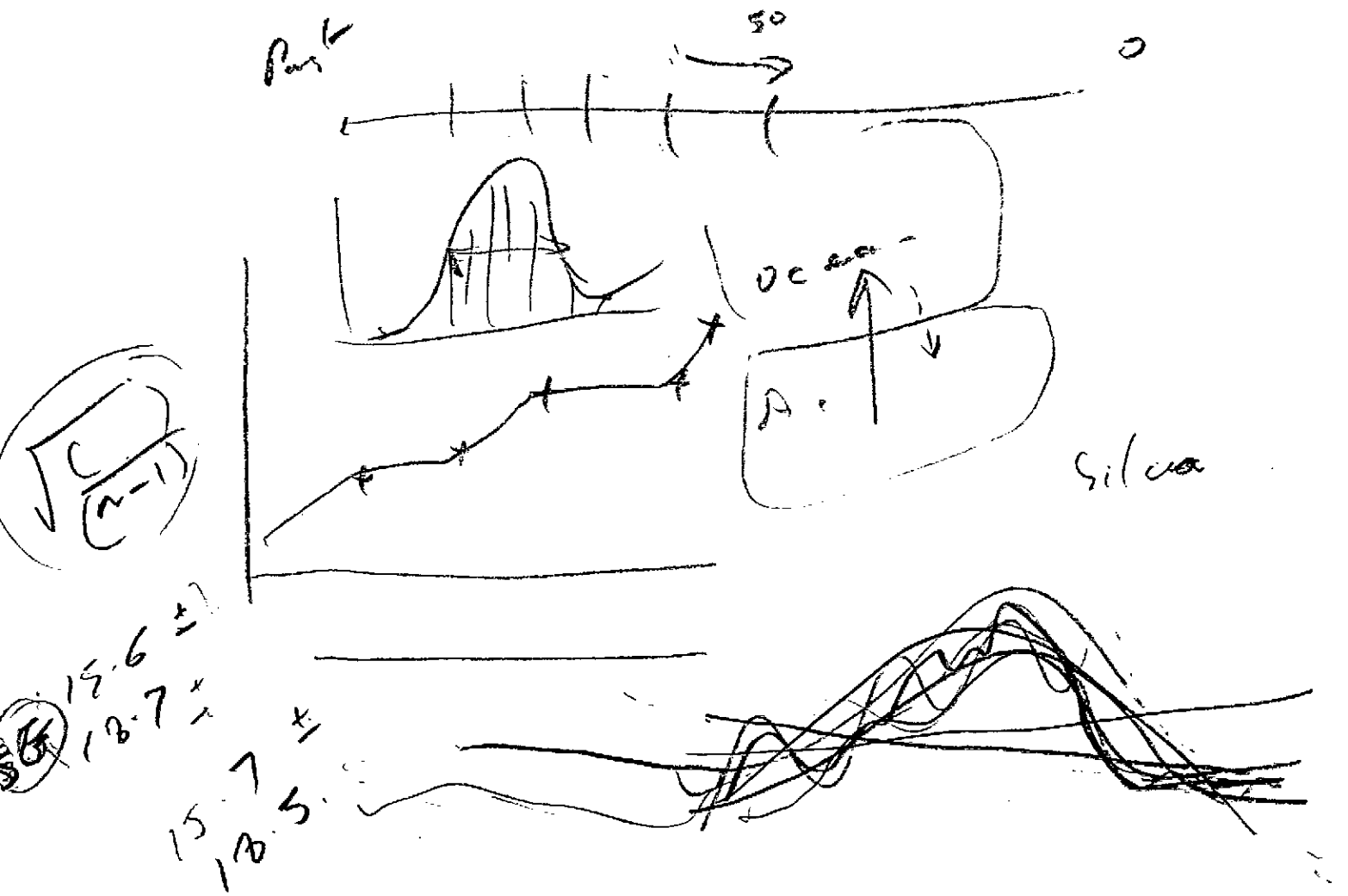
$$\frac{Pb^{206}}{Pb^{204}}_{t_2} = \frac{Pb^{206}}{Pb^{204}}_{t_{initial}} \sum \mu_i \left(e^{\lambda t_1} + e^{\lambda t_2}\right)$$

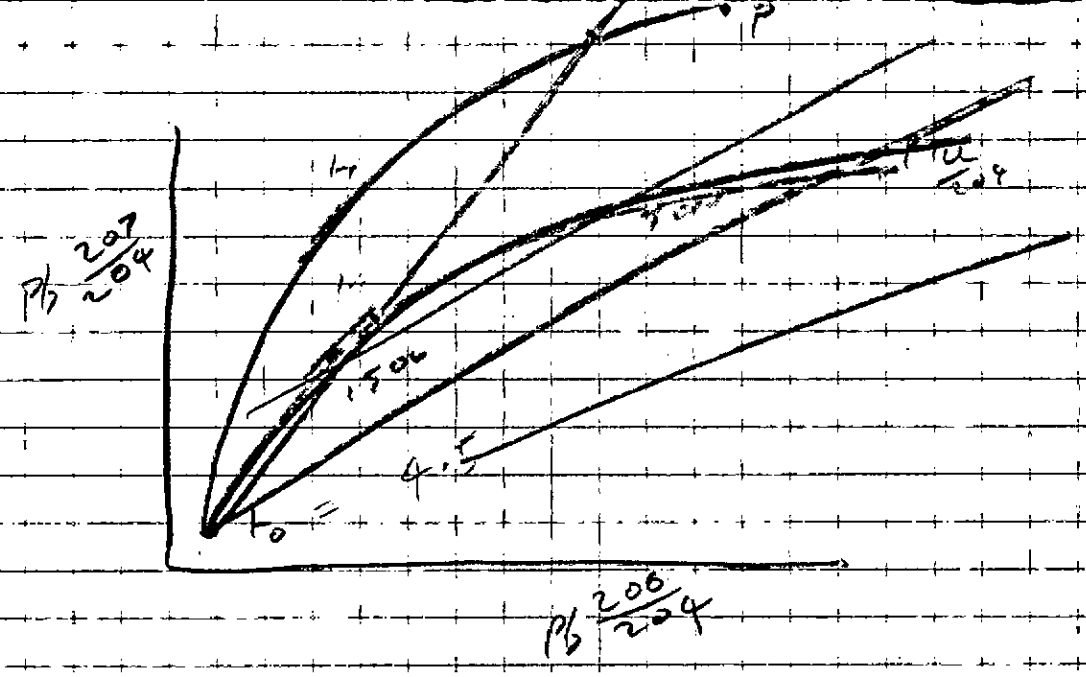

u
2·7
7,1·5
35,0
u


u
Pb
u
u
204
The
206


traction
204
1.5
1.7
207


$\frac{\nu}{Ph}$
$Pb^{\frac{207}{204}}$
t
T∞
P
10 -
$\frac{206}{204}$
100
(7)
$S = \frac{e^{\lambda t_1} - e^{\lambda t_2}}{e^{\lambda t_1} - e^{\lambda t_2}}$

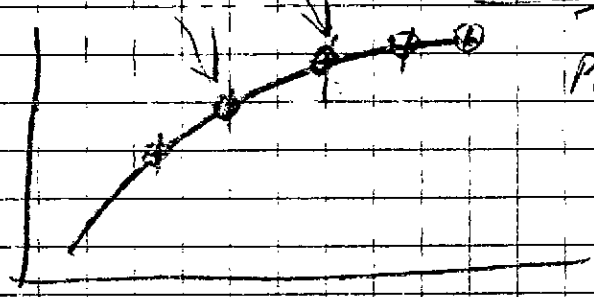

50
0
Ocean
A.
Silica
$\sqrt{\frac{C}{(n-1)}}$
15.6 ±
18.7 ±
15.7 ±
18.5



$$\frac{U^{238}}{U^{235}} \rightarrow \frac{Pb^{206}}{Pb^{207}}$$

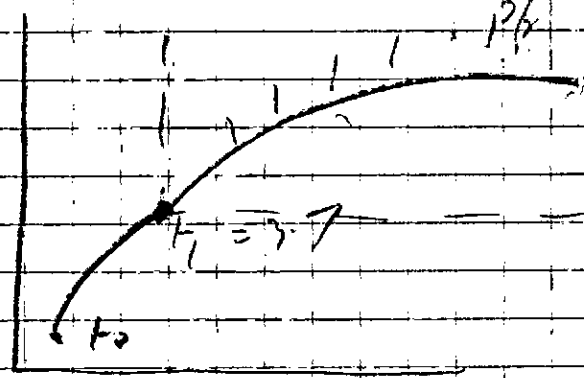
$$\frac{Pb^{207}}{Pb^{204}} = \frac{U^{235}}{U^{238}}\left(e^{\lambda t} - 1\right)$$

$$\frac{Pb^{206}}{Pb^{204}} = \frac{U^{238}}{U^{238}}\left(e^{\lambda t} - 1\right)$$

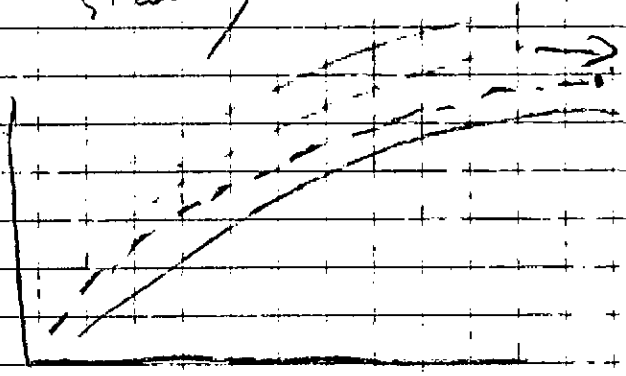


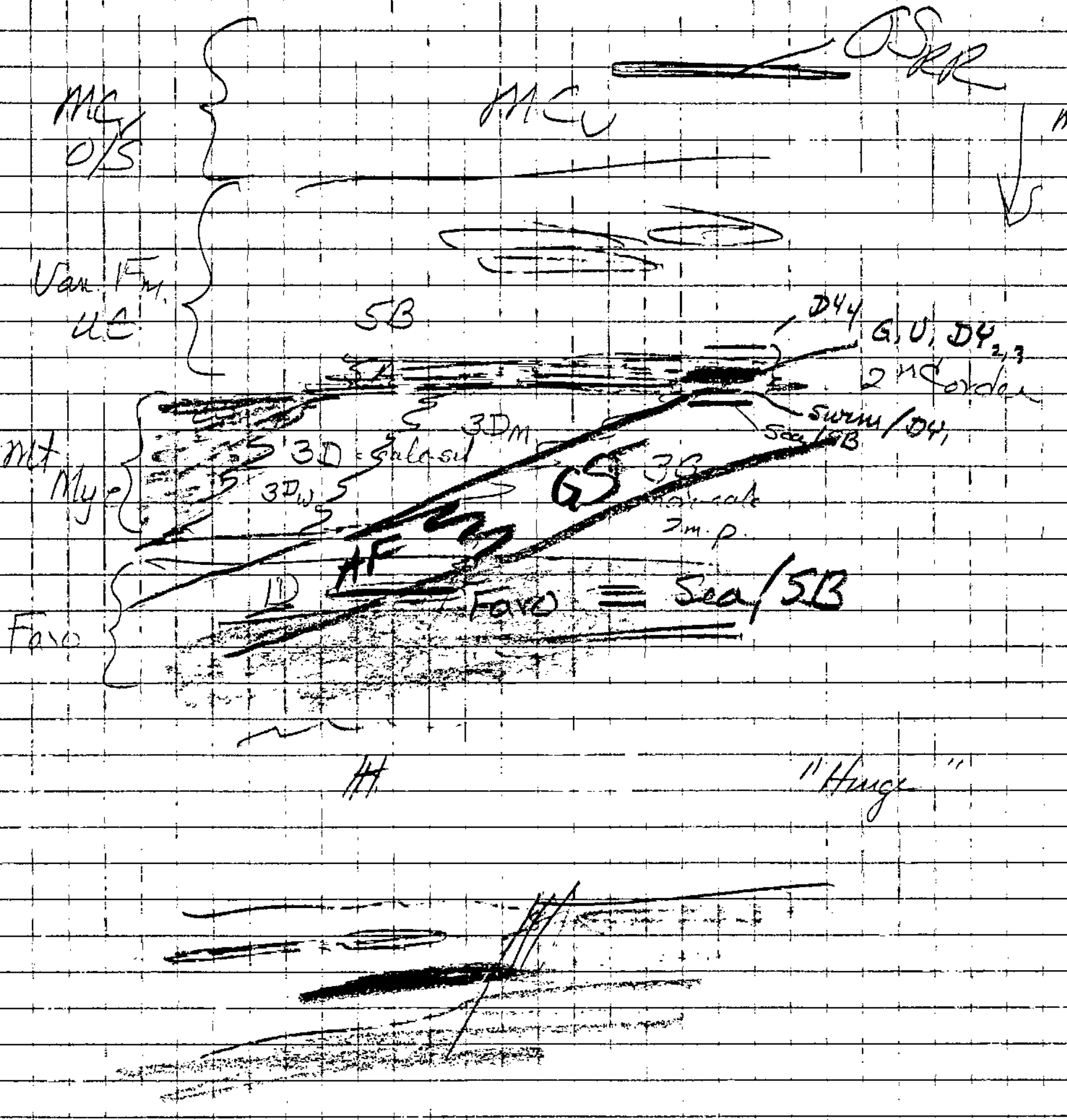
$$\frac{U^{238}}{U^{235}} = 137.88$$

$$\frac{Pb^{207}}{Pb^{206}} = \frac{1}{K}\,\frac{\left(e^{\lambda_{7}t} - 1\right)}{\left(e^{\lambda_{6}t} + 1\right)}$$



Kramers stacey




MC O/S
MCU
OS RR
MO
Van Fm. UC
SB
D44
G, U, D4
2nd order
Sea/SB
3DM
3DW
GS
AF
Favo = Sea/SB
Favo
"Huge"

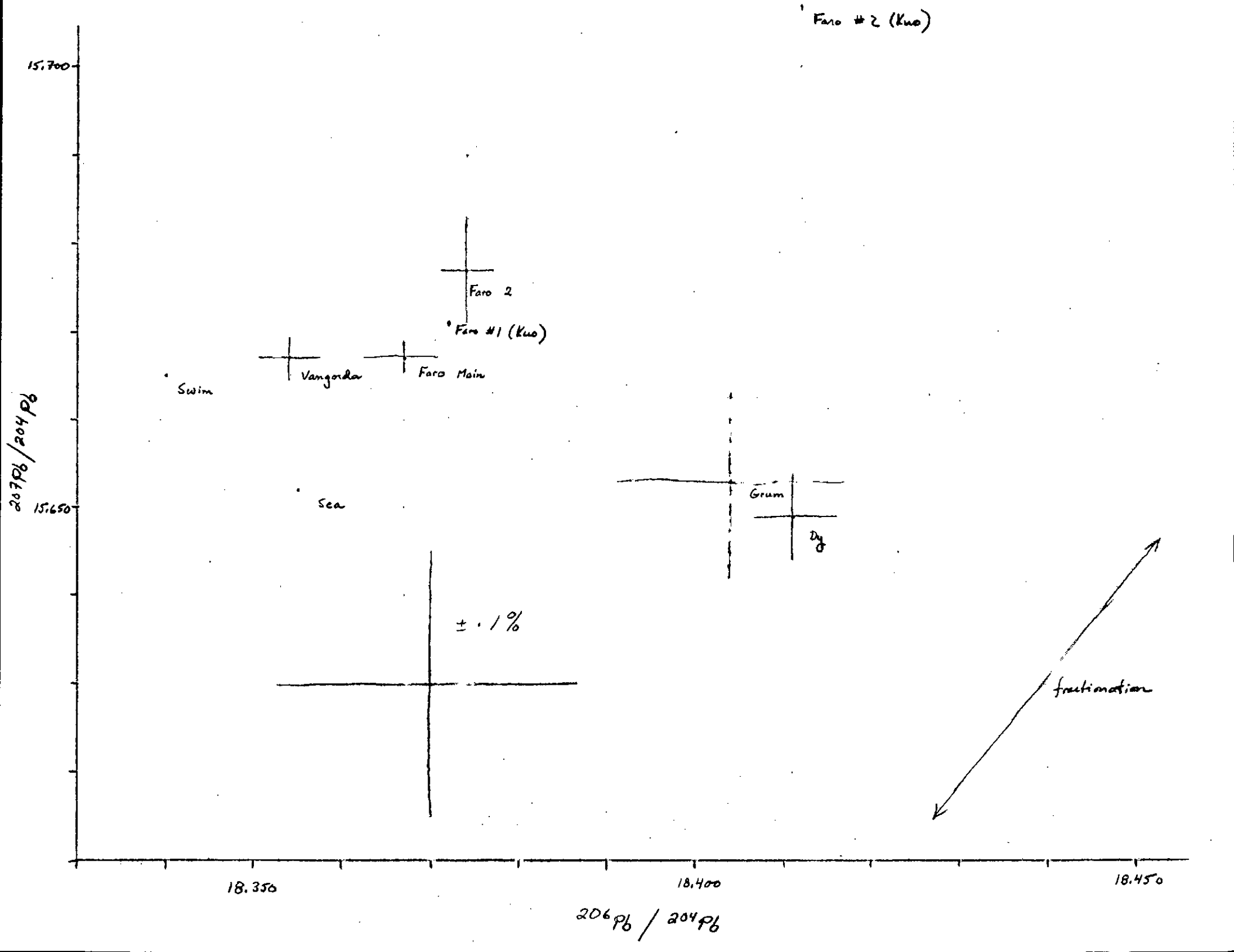
Anvil Range Pb Isotope Results

Values all normalized to Broken Hill standard (6/4 - 16.003, 7/4 - 15.389, 8/4 - 35.657)

Deposit	# Samples	Reference	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}
Faro Main	7	1.	18.367 (.0053)	15.667 (.0022)	38.350 (.012)
Faro No. 2	2	1	18.374 (.028)	15.677 (.0066)	38.365 (.044)
Vangorda	5	1	18.354 (.0032)	15.667 (.0026)	38.301 (.012)
Sea	2	1	18.355 (.13)	15.652 (.017)	38.300 (.16)
Swim	4	1	18.340 (.0022)	15.665 (.002)	38.293 (.0075)
Grum	7	2	18.404 (.013)	15.653 (.011)	38.373 (.046)
Dy	22		18.411 (.031)	15.649 (.033)	38.359 (.052)

1 LeCouteur, P.C. 1973. A study of lead isotopes from mineral deposits in southeastern British Columbia and in the Anvil Range, Yukon Territory. Unpublished PhD thesis, University of British Columbia, 155 p.

2


Faro #2 (Kuo)
15.700
15.650
207Pb/204Pb
Faro 2
Faro #1 (Kuo)
Vangorda
Faro Main
Swim
Sea
Grum
Dy
± .1%
fractionation
18.350
18.400
18.450
206Pb / 204Pb

Pb Isotope Work for Barry Ryan

Vangorda

V-20-R	260.0'	4GO
V-35-R	150.0'	4FE86
V-47-R	190.0'	4G8
V-94-R	169.0'	4G4
V-95-R	250.0'	4E6
V-96-R	290.0'	4E6

Grum

A-19	681.0 - 685.0'	4E1 4C0
A-23	347 - 351'	4G
A-135	130.4 - 130.7'	4DE

Swim

A 13	131.0 - 133.0'	4E6 ?
A 25	332.0 - 335.0'	4E8
A 30	422.0 - 424.0'	4E17
A 31	252.4 - 255.4'	4 CEL
A 35	365 - 368	4E8

SB

74c 3	250 - 260'	
7404	431 - 441'	SB with 2th vein
7405	257 - 267'	SB
(45c) 7503	858 - 860'	4L
(456 7504	914 - 917'	4L7

FARO

ZONE 2 3890 massive sulfides

AM CLAIM

78 NA 03 67.4-67.8 M 5B

Pb in vein

Dy — Section 18+00 E

Correlations between 77-X-11 and 78-X-11 (latest "possible" interp)

Horizon	77-X-11	78-X-11
2	2579	NONE
	2574	
	2569	
3	NONE	2856
		2848
		2846
		2844
		2840
		2839
		2835
		2833
4	2558	2832
	2551	2829
		2828
		2826
5	2547	2825
	2540	2819
	2527	