

Evaluation of lead isotopes in exploration:
Assessment of further anomalies from the
Elliott Bay area for Geopelko.

MIRRORED

OPEN FILE

86-2527

EVALUATION OF LEAD ISOTOPES IN EXPLORATION: ASSESSMENT OF FURTHER ANOMALIES
FROM THE ELLIOTT BAY AREA FOR GEOPEKO

Previously, twelve anomalies were assessed using the Pb isotope technique without any knowledge of sample location or geology. The 13 anomalies reported here either represent assessment of geological/geochemical/geophysical targets or testing of problems that arose during the earlier analyses. Sampling locations and information was supplied by Geopeko.

The isotope ratios are given in the Tables; Pb concentrations are as supplied by Geopeko. Conventional plots of 207/204 and 208/204 vs 206/204 are enclosed for each anomaly; on each diagram are plotted the reference isotopes for Rosebery and vein style mineralization from the Central Lava Belt.

MICROFILMED

JG1

SUMMARY OF MAIN ISOTOPIC GROUPINGS FROM ELLIOTT BAY 052002

ISOTOPIC SIGNATURE			EXAMPLES	COMMENTS
208/ 206	207/ 206	206/ 204		
2.0842- 2.0848	0.8538- 0.8541	18.276- 18.289	Rosebery main ore	Target
2.097	0.862	18.1	Groups 1 and 6 Voyager 19	V19 Style
2.094	0.859	18.18	Group 4 Voyager 2	Less Radiogenic Style (LRS)
2.0918	0.8573	18.19	Group 20 Voyager 20	"
2.0892	0.8562	18.22	Group 22 Voyager 29 W Charg. Anom.	"
2.0897	0.8566	18.21	Group 23 Voyager 33 14200N Charg. Anom.	"
	variable		Group 11 Voyager 34	"
	variable		Group 24 Voyager 34 N Soil	Low grade variation of LRS
	variable		Group 12 Voyager 9	?? LRS
	variable		Group 15 Voyager 19 Western Anom.	?? Mixture of LRS and target
2.0896±10	0.8557±3	18.263±15	Group 7 Voyager 29 soils Group 8 Voyager 29 rocks	Target Style " " + veins
2.0872	0.8548	18.253	Group 14 Voyager 19 South	" "
			Group 9 Voyager 30 Granite sulfides	" "
2.0809- 2.0880	0.8446- 0.8548	18.482- 18.256	Group 16 Voyager 29 W. Soil Anom.	Lowgrade Rosebery or deeply buried high grade target
	variable		Groups 2 and 3 Voyager 24 soils and rocks	?? Gold associated with target massive sulfides
	variable		Group 18 Voyager 3	Low-grade target style
	variable		Group 21 Voyager 16	?? mixture low-grade target and vein
2.0742	0.8462	18.473	Group 5 Voyager 31	Vein Style
	variable	>18.5	Group 9 Voyager 30	" "
2.0752	0.8445	18.50	Group 10 Voyager 33	" "
	variable		Group 25 Voyager 12	?? mixture low-grade target, vein and LRS

SUMMARY

From the 25 anomalies investigated to date using Pb isotopes, it is possible to distinguish 4 major groups. In the accompanying summary table, the groups are arranged in order of increasing radiogenicity. The 4 groups are as follows:

- A. Voyager 19 style (typified by Lens A and B massive sulfides)
- B. LRS - Less Radiogenic Style whose $^{206}/^{204}$ ratios are in the range 18.18 to 18.22
- C. Target Style - e.g. Voyager 29 whose isotopic ratios are very similar to Rosebery
- D. Vein Style - with $^{206}/^{204}$ ratios usually > 18.4 .

My major concern is that, in view of the widespread occurrence of LRS, it could be the target and until drill core material of this style becomes available, the uncertainty remains.

GROUP 13 - VOYAGER 19 - VOLCANIC ROCK SUITE

These samples were analysed because of the unusual ratios found in the massive sulfides (Group 6) which were interpreted to be exotic for this area (RIR 1406R).

DDH V19-1 - The massive sulfide lens A has a 206/204 ratio of 18.08. In contrast, samples KR 9874 (6150 ppm Pb) and KR 9022 (410 ppm Pb) have 206/204 ratios of 18.24 and 18.34. The ratios in KR 9022 may be due to radioactive decay but it is highly unlikely for KR 9874 with such high amounts of Pb. This would be interpreted to mean that the metals in the sulfide lens were not derived from the volcanics such as KR 9874 or alternatively, that the Pb in KR 9874 is from an exotic source.

The isotopic ratios for sample KR 9874 have some similarities with those for Group 22.

The radiogenic nature of KR 8898 is probably due to radioactive decay as it only contains 20 ppm Pb.

DDH V19-3 - Both samples from this hole have radiogenic ratios probably due to radioactive decay as they only contain 20-30 ppm Pb.

DDH V19-4 - This is a short hole drilled under the southern massive sulfide lens B. Sample KR 10006 (16-18m) contains 510 ppm Pb and KR 10025 (39-40m) 20 ppm Pb. The ratios in lens B are 18.13 and are much less radiogenic than KR 10006 with a 206/204 ratio of 18.21; however, this may be the result of radioactive decay although the U concentrations need to be fairly high as the rock contains 510 ppm Pb.

A regression of all Group 13 data (Fig.1a) shows them to lie on a well-defined line with a Mean Square of Weighted Deviates (MSWD) of 0.5 and an apparent age of 466 ± 26 Ma (1σ). The line intersects the growth curve at 1.1 Ga. This apparent age would appear to be slightly younger than that obtained at Que River of 540 ± 30 Ma (2σ) but, because of the peculiar isotopic systematics in lens A and B, correlations may not be valid. The fact that the data all lie on the same line (Fig.1c) on the 208/204 vs. 206/204 plot (MSWD 1.2) indicates that all the samples could be related.

Interpretation - The apparent difference in isotopic composition of the high-Pb rocks and overlying sulfide lenses would suggest that the Pb has a different source and that the sulfide lenses are exotic relative to the volcanics. On the other hand, the data lie on lines which pass through the average isotope values for lens A and B, so the alternative interpretation is that the sulfides were derived from the volcanics.

004

COEFF. OF VARIATION= .99994 0 DELETIONS 052005
 SLOPE= 14.577 Y INTERCEPT= .05611 MEAN X= .052093 MEAN Y= .81547
 STD DEV OF X= .0038019 7.298 % STD DEV OF Y= .055423 6.796 %

SLOPE= 14.57244+/- .00625 INTERCEPT= .05635+/- .00065
 MSWD= .5

AGE= .4660+/- .0260 b.y.

INTERSECTION AT T=1.095 X= .0592 Y= .9192

VOYAGER 19 VOLCANIC ROCK

207/206

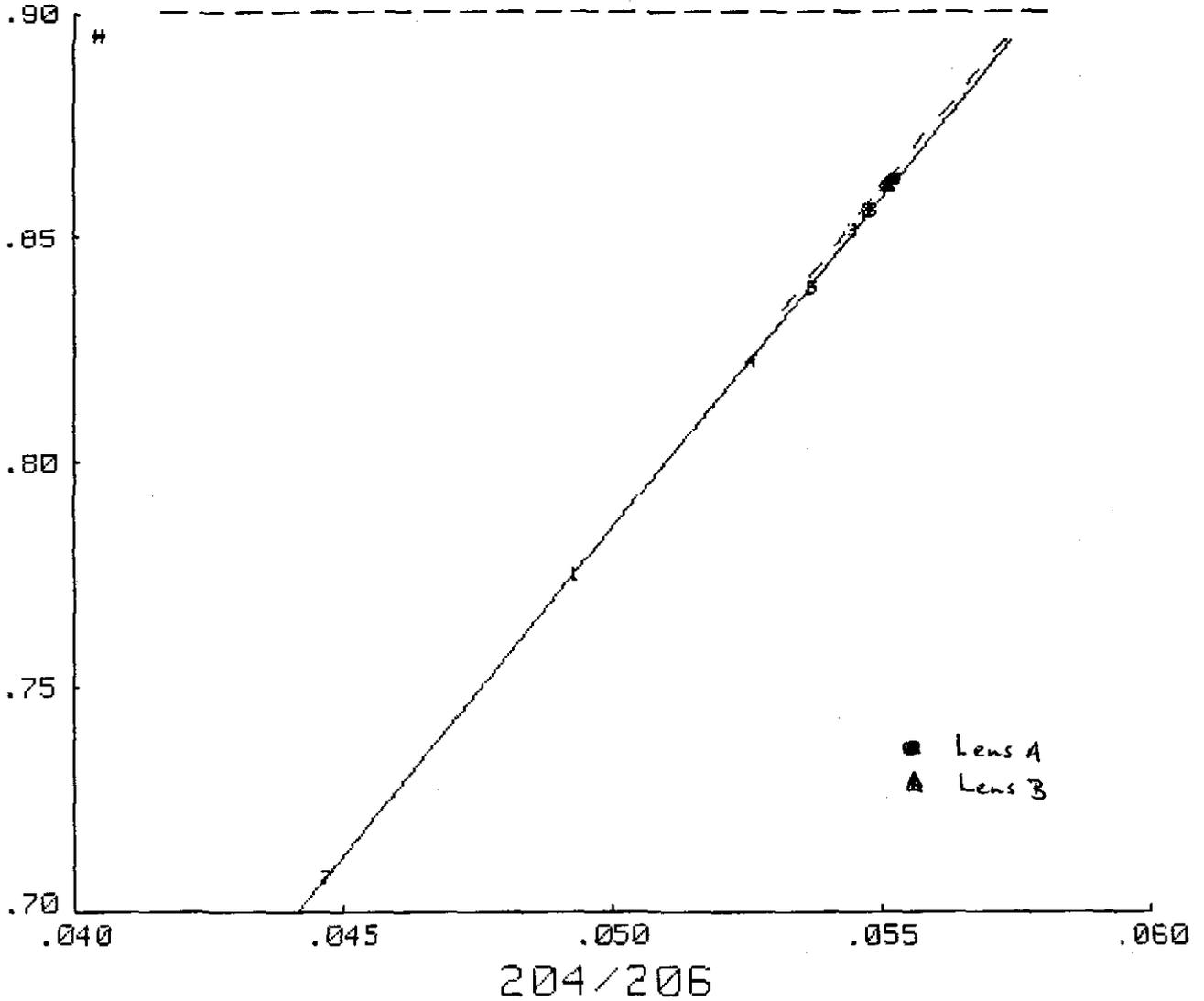


Fig. 1a

000

052000

COEFF. OF VARIATION= .99238 0 DELETIONS
 SLOPE= .056399 Y INTERCEPT= 14.571 MEAN X= 19.292 MEAN Y= 15.659
 STD DEV OF X= 1.5382 7.973 % STD DEV OF Y= .087422 .5583 %

SLOPE= .05639+/- .00046 INTERCEPT=14.57163+/- .01774
 MSWD= .3

INTERSECTION AT T=1.101 X=16.8790 Y=15.5230

VOYAGER 19 VOLCANIC ROCK

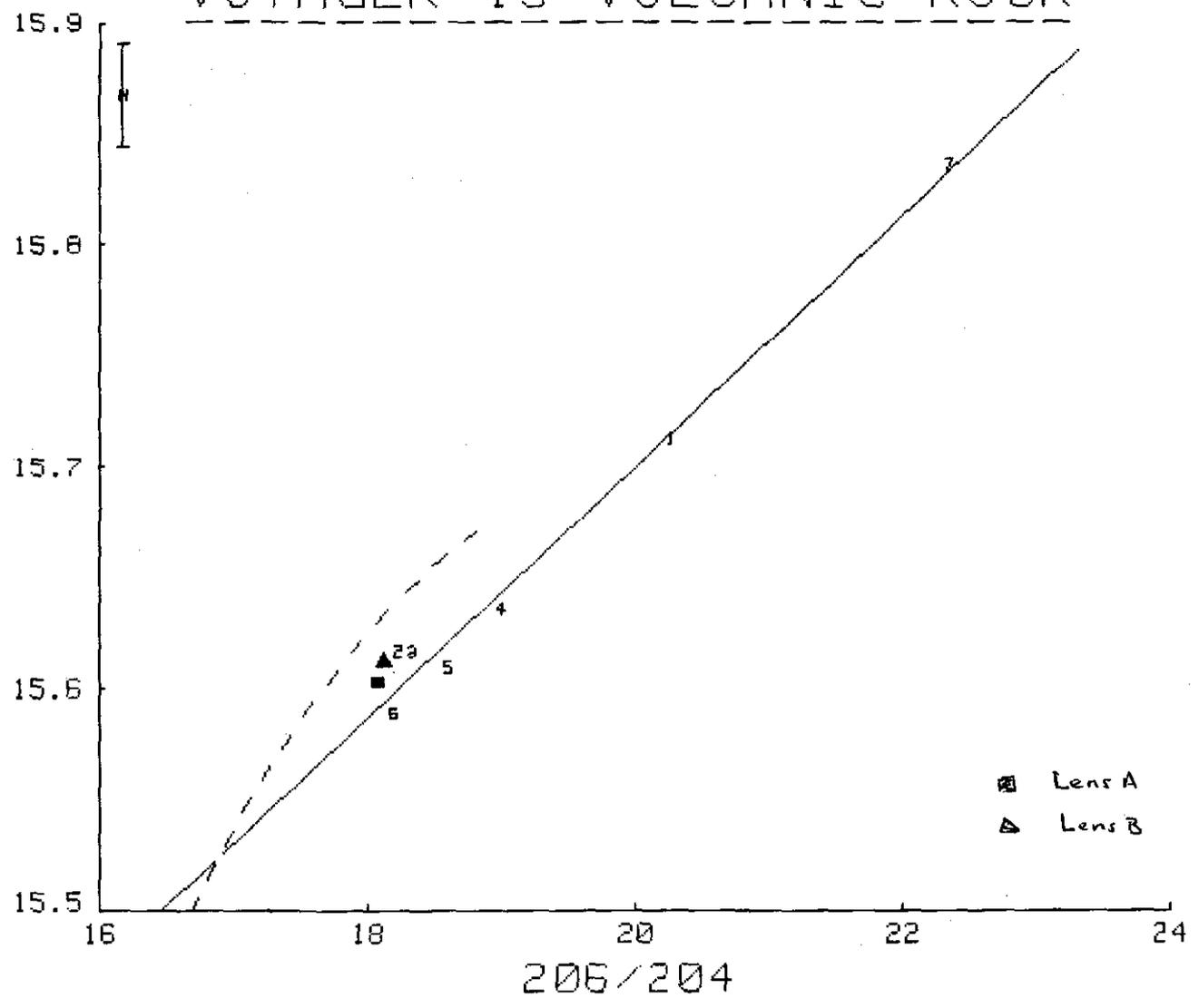


Fig. 16

207/204

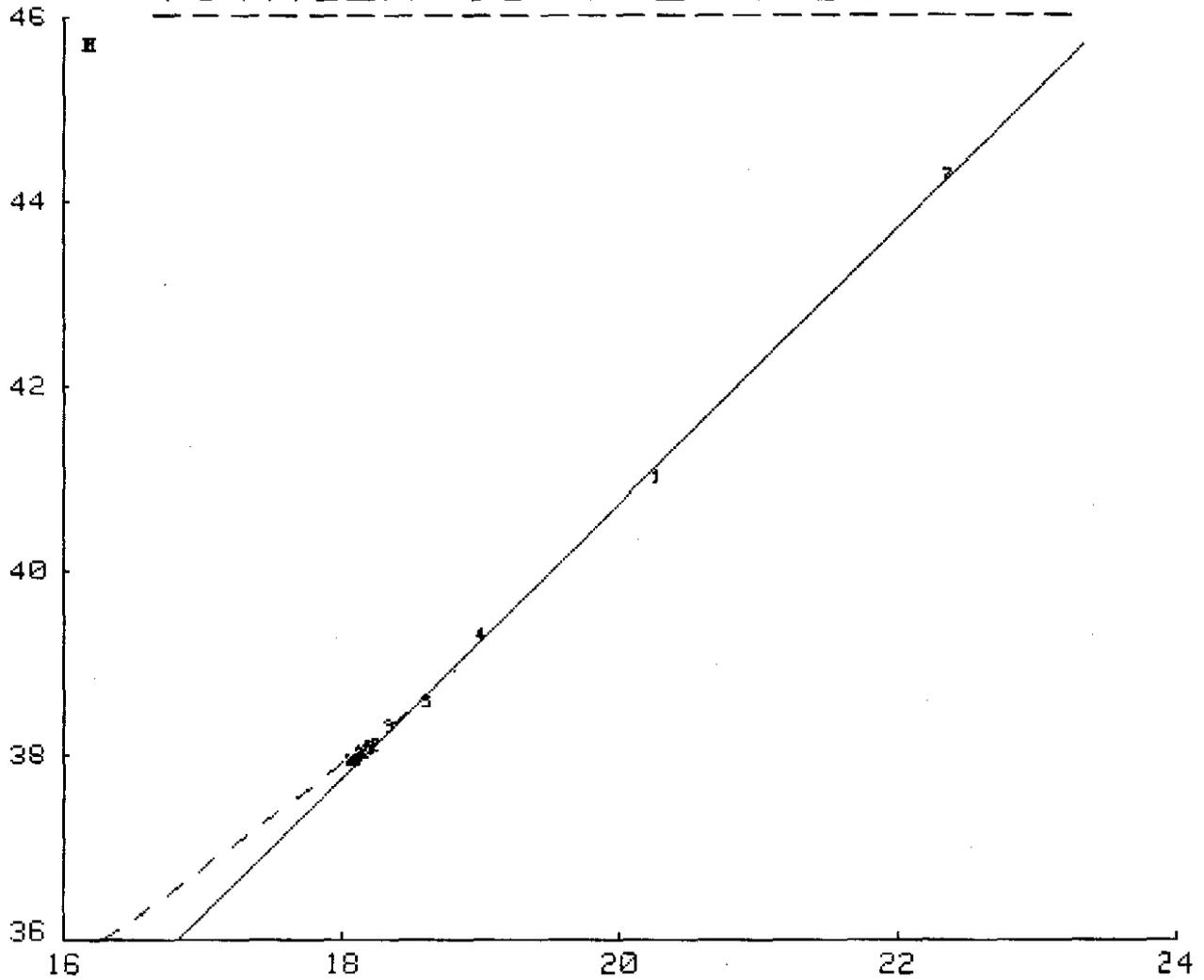
206/204

COEFF. OF VARIATION= .99959 0 DELETIONS
 SLOPE= 1.4845 Y INTERCEPT= 11.03 MEAN X= 19.292 MEAN Y= 39.669
 STD DEV OF X= 1.5382 7.973 % STD DEV OF Y= 2.2844 5.759 %

SLOPE= 1.48247+/- .00129 INTERCEPT=11.06808+/- .04960
 MSWD= 1.2

INTERSECTION AT T= .176 X=18.5280 Y=38.5340

VOYAGER 19 VOLCANIC ROCK



206/204

Fig. 1c

208/204

007

GROUP 14 - Pb - Zn SOIL ANOMALY SOUTH OF VOYAGER 19

This group of samples was analysed to establish if there is a regional zoning in isotopic ratios from Voyager 19 (Group 1) and Voyager 29 (Group 6).

Line 12150 N - Samples TS 15060 and 15061 are from the same locality and contain 1500 ppm Pb. Their isotopic ratios are almost identical and give a good idea of the analytical precision. Sample TS 15062 (890 ppm Pb) also has the same ratios. Sample TS 15059 has more radiogenic ratios than the above 3 samples with a 206/204 of 18.33 (cf. 18.26) but this is probably due to radioactive decay as it only contains 200 ppm Pb.

Line 12050N - Sample TS 15089 has the same ratios as TS 15059, which are also probably due to radioactive decay.

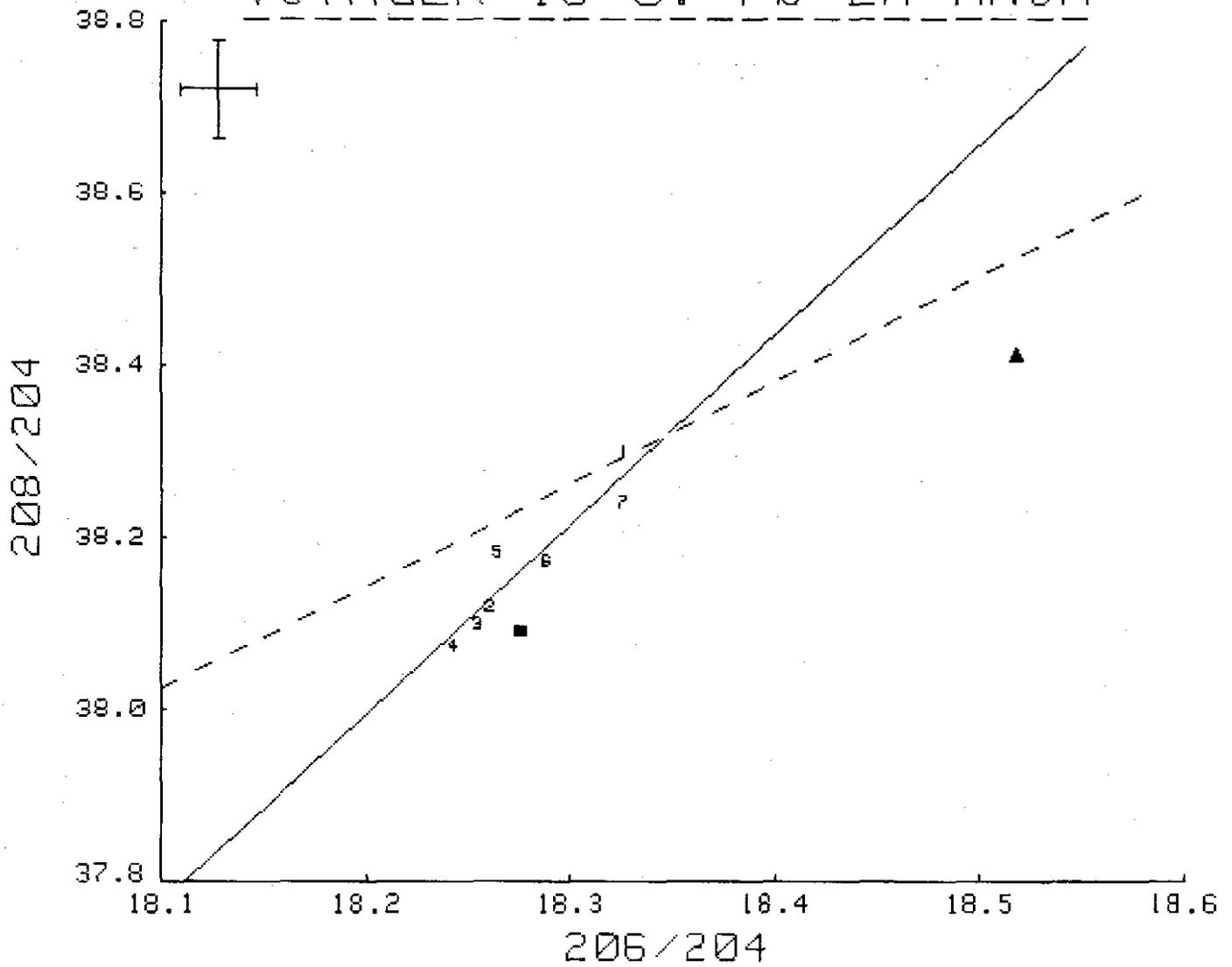
Assessment - There does not appear to be a regional zoning from V 19 to V 29. However, Group 14 samples have a similar isotopic composition to those of V 29, particularly those around 12150N, 10175-10200E.

Priority - No.1 (Top) as the ratios are the same as the target.

Query - The high Pb lines between 11800 and 12000N may also have the correct target signature.

COEFF. OF VARIATION= .94051 0 DELETIONS
 SLOPE= 2.1989 Y INTERCEPT=-2.0283 MEAN X= 18.281 MEAN Y= 38.17
 STD DEV OF X= .034358 .1879 % STD DEV OF Y= .08033 .2105 %
 INTERSECTION AT T= .281 X=18.3490 Y=38.3190

VOYAGER 19 S. Pb-Zn ANOM

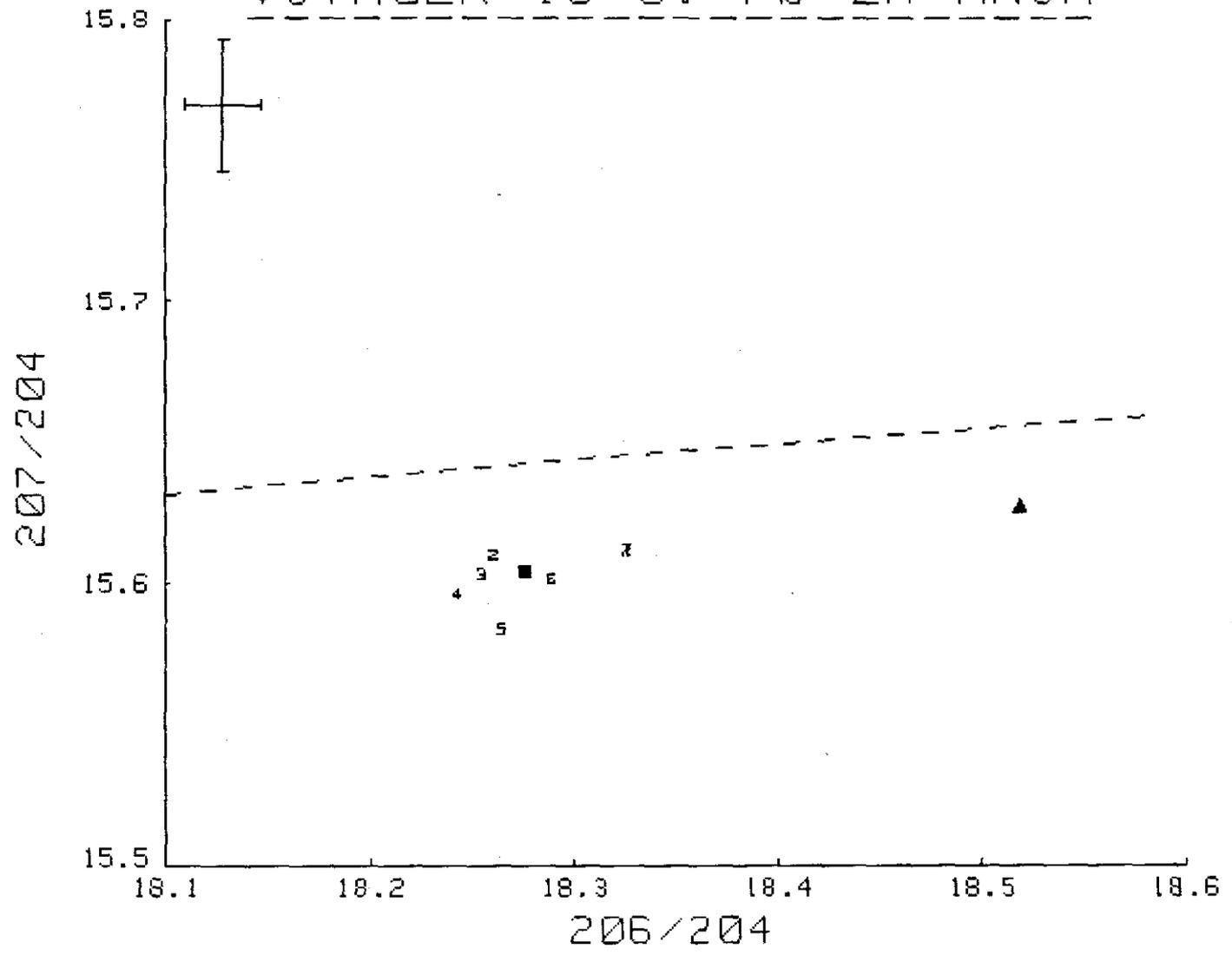


009

052010

COEFF. OF VARIATION= .57057 0 DELETIONS
 SLOPE= .16924 Y INTERCEPT= 12.509 MEAN X= 18.281 MEAN Y= 15.602
 STD DEV OF X= .034358 .1879 % STD DEV OF Y= .010191 .06532 %
 INTERSECTION AT T=2.537 X=13.9910 Y=14.8770
 INTERSECTION AT T= .115 X=18.6320 Y=15.6620

VOYAGER 19 S. Pb-Zn ANOM



GROUP 15 - VOYAGER 19 - WESTERN Pb-Zn SOIL ANOMALY

This group of samples all come from line 12300N.

The isotopic ratios exhibit some variability, part of which may be explained by radioactive decay as in the case of TS 9702 and TS 10506 with 55 and 40 ppm Pb respectively. Both of these samples are located on the margins of the anomaly.

Samples TS 9703 with 135 ppm Pb has less radiogenic values (206/204 18.21, 207/206 0.8562) than the expected target signature and TS 9705 with 1500 ppm Pb has more radiogenic values (but which are nevertheless, the same as Que River).

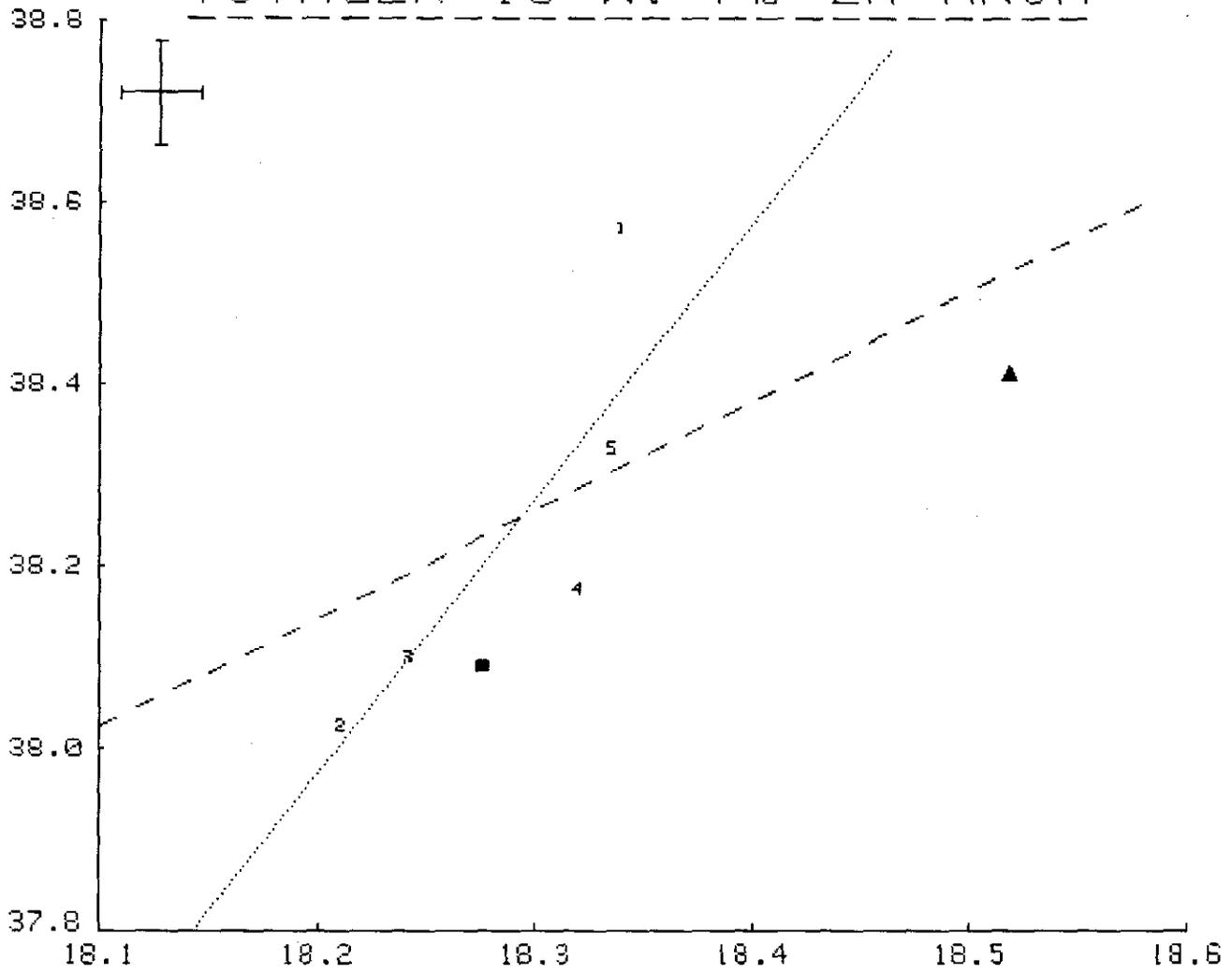
Assessment - The variability in isotopic composition between samples is not apparently solely the result of radioactive decay and may be due to mixing of Pb from a number of sources. Consequently, it is difficult to establish if these soils are from the same stratigraphic level as at Voyager 19.

Priority - Lower ?? 3/4

COEFF. OF VARIATION= .82499 0 DELETIONS
 SLOPE= 3.0029 Y INTERCEPT=-16.682 MEAN X= 18.29 MEAN Y= 38.24
 STD DEV OF X= .059484 .3252 % STD DEV OF Y= .21652 .5662 %
 INTERSECTION AT T= .312 X=18.2960 Y=38.2550

VOYAGER 19 W. Pb-Zn ANOM

208/204



206/204

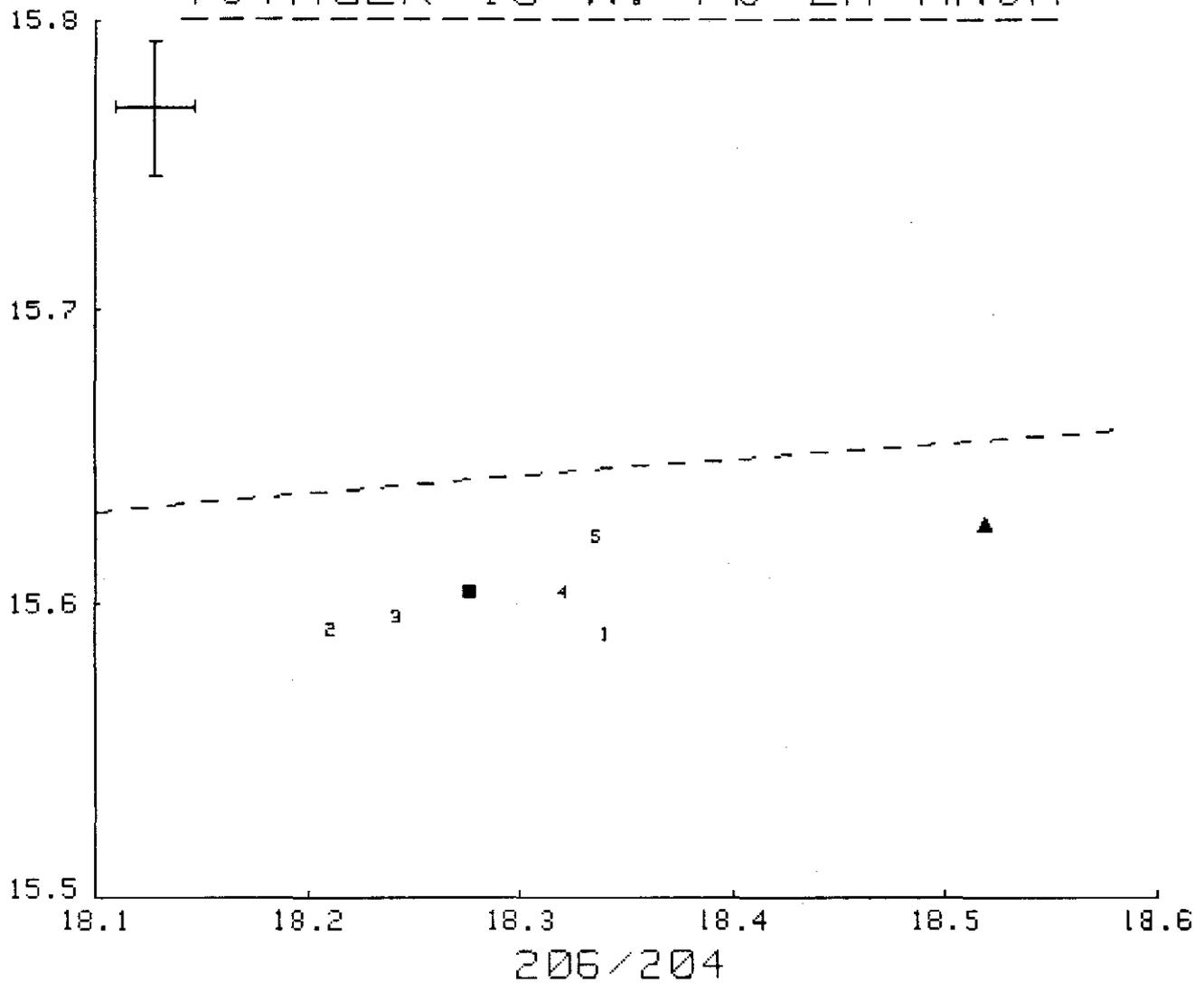
016

052013

COEFF. OF VARIATION= .48474 0 DELETIONS
 SLOPE= .11069 Y INTERCEPT= 13.576 MEAN X= 18.29 MEAN Y= 15.601
 STD DEV OF X= .059484 .3252 % STD DEV OF Y= .013583 .08707 %
 INTERSECTION AT T=1.884 X=15.3560 Y=15.2760

VOYAGER 19 W. Pb-Zn ANOM

207/204



GROUP 16 - VOYAGER 29 - WESTERN Pb-Zn SOIL ANOMALY

This group of samples is possibly along strike from Group 15.

Line 11400N - The four samples are located about 400 m south of the Voyager 19 south anomaly (Group 14). The samples exhibit some variation in isotopic ratios which, when Pb concentrations are considered, appears to arise from radioactive decay. Only TS 16515 with 1200 ppm Pb has the target signature.

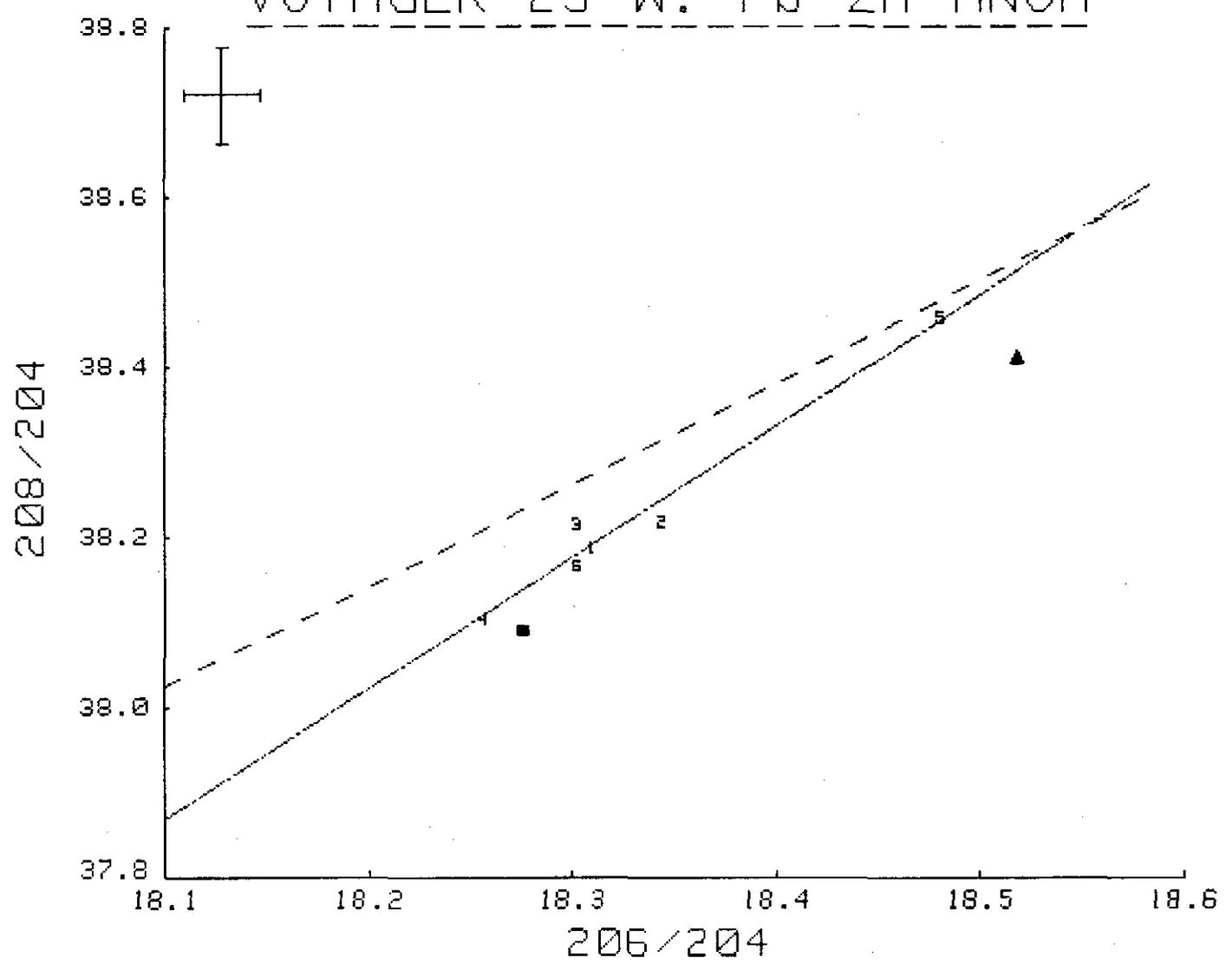
Line 10600N - The two samples have relatively low Pb concentrations of 310 and 175 ppm and the ratios are slightly more radiogenic than the target with 206/204 ratios of 18.31 and 18.34 (cf. 18.26). These ratios are probably the result of radioactive decay.

Assessment - The isotopic pattern found in this anomaly could be derived from either low-grade or high-grade deeply buried mineralization of the Rosebery style. The main area of interest is around TS 16515.

Priority - 2/3

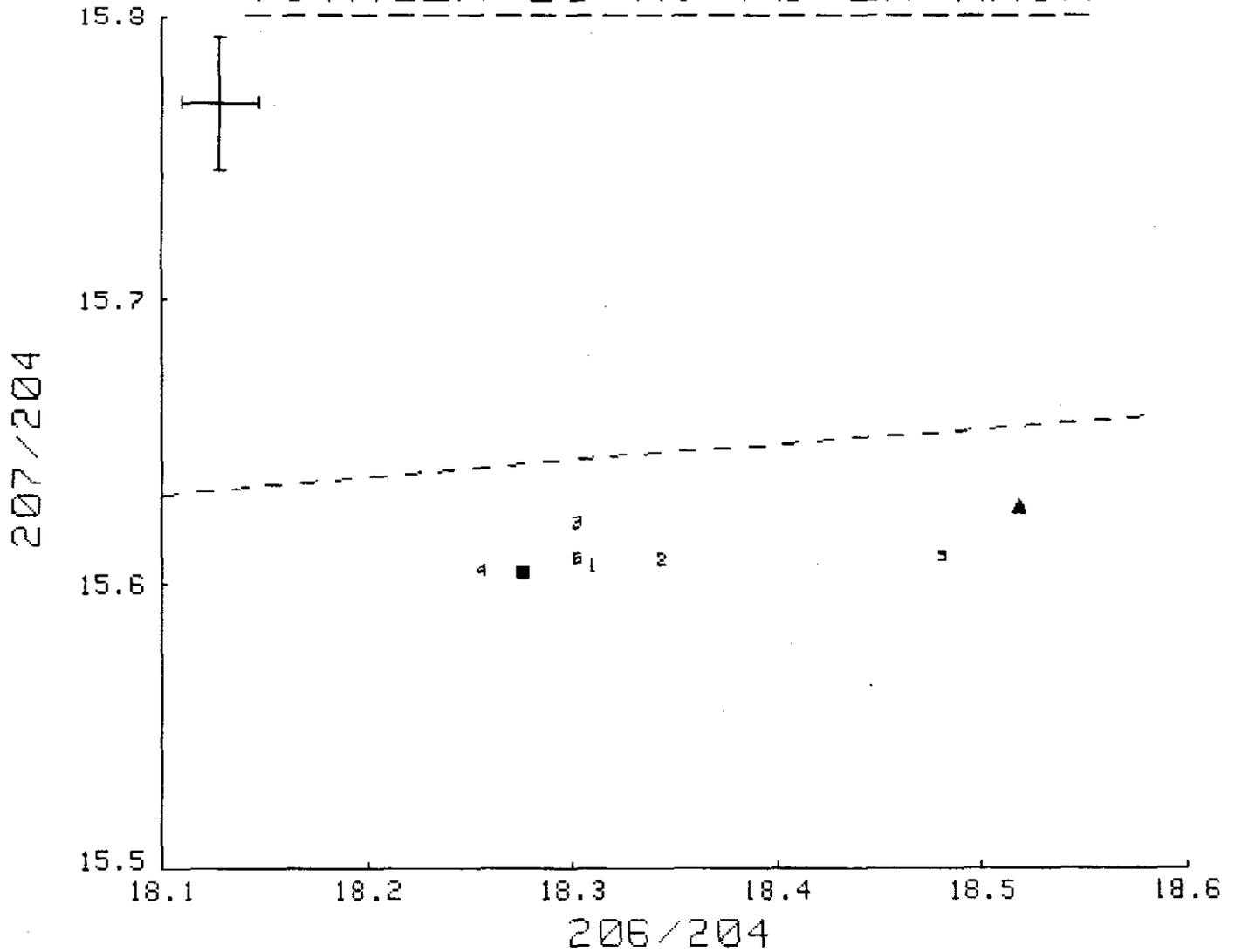
COEFF. OF VARIATION= .98574 0 DELETIONS
 SLOPE= 1.5369 Y INTERCEPT= 10.049 MEAN X= 18.333 MEAN Y= 38.225
 STD DEV OF X= .078164 .4264 % STD DEV OF Y= .12187 .3188 %
 INTERSECTION AT T= .161 X=18.5540 Y=38.5650

VOYAGER 29 W. Pb-Zn ANOM



COEFF. OF VARIATION= .04664 0 DELETIONS
 SLOPE= .0035861 Y INTERCEPT= 15.544 MEAN X= 18.333 MEAN Y= 15.61
 STD DEV OF X= .078164 .4264 % STD DEV OF Y= .00601 .0385 %
 INTERSECTION AT T= .608 X=17.7780 Y=15.6080

VOYAGER 29 W. Pb-Zn ANOM



GROUP 17 - VOYAGER 30 - BARREN GRANITE/AUGER SAMPLES

The samples from Line 7300N are some 700m south of veins analysed previously (Group 9; TS 16709, TS 16714, TS 16715). They contain from 25 to 95 ppm Pb.

The isotopic ratios are all radiogenic and have 206/204 ratios ranging from 19.16 to 22.41.

On the 207/206 vs 204/206 plot (Fig. 5), the data define an excellent line with a MSWD of 0.1 and apparent age 330 ± 30 Ma (1σ), i.e. Devonian Carboniferous granite.

Interpretation - In the previous study, sulfides from the granite contained the target signature and this was used to support a Cambrian age for the granite. If the granite is Devonian Carboniferous, then the only explanation for the sulfides in the granite is that they were re-mobilized from Rosebery-style mineralization in the Wart Hill Pyroclastics.

It is highly unlikely that a Cambrian granite can be totally reset during Devonian-Carboniferous plutonism.

017

052018

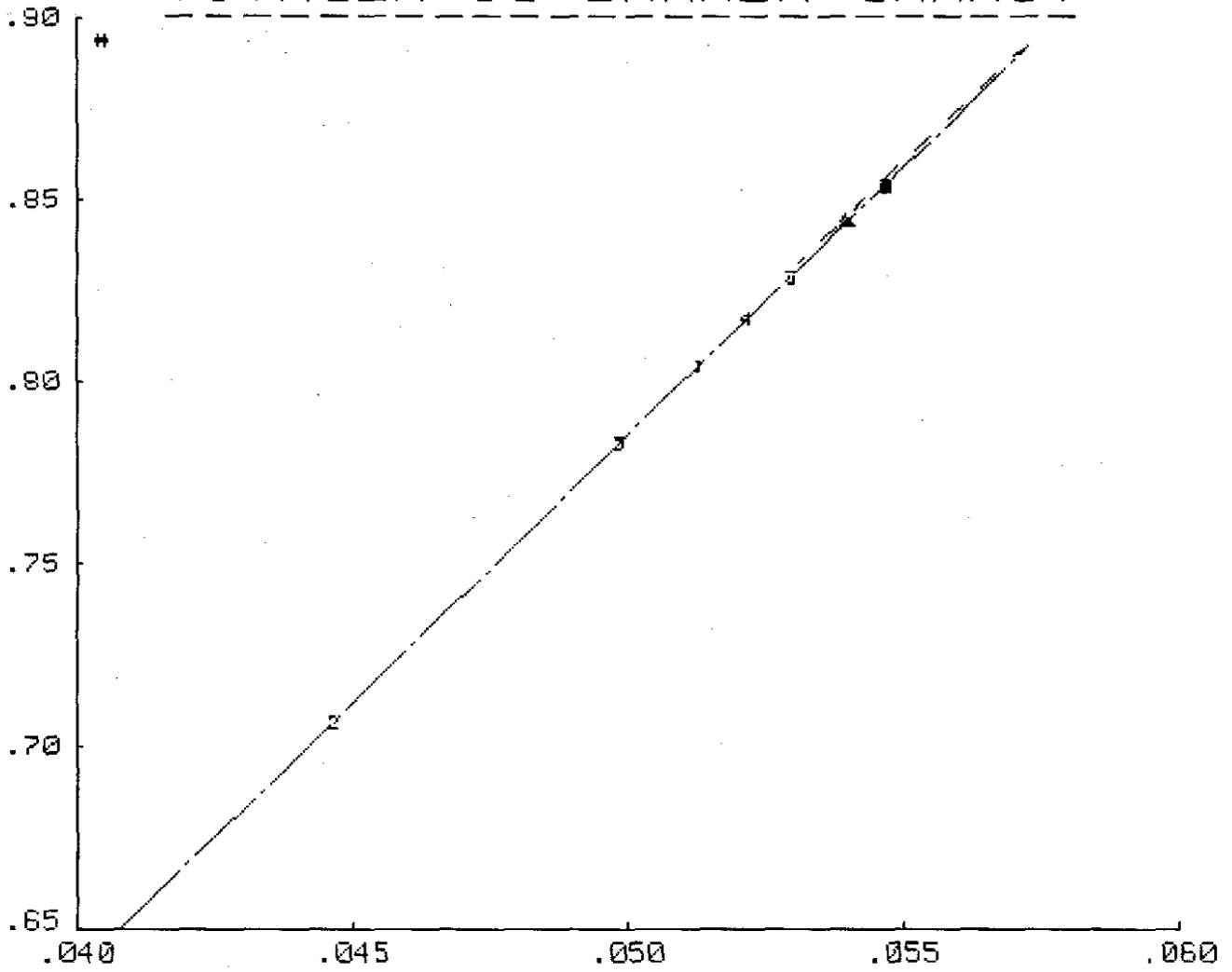
COEFF. OF VARIATION= .99999 0 DELETIONS
 SLOPE= 14.638 Y INTERCEPT= .053208 MEAN X= .050199 MEAN Y= .78801
 STD DEV OF X= .0033233 6.62 % STD DEV OF Y= .048646 6.173 %

SLOPE= 14.64141+/- .00743 INTERCEPT= .05302+/- .00074
 MSWD= .1

AGE= .3295+/- .0320 b.y.

INTERSECTION AT T= .982 X= .0585 Y= .9092

VOYAGER 30 BARREN GRANIT



207/206

204/206

Fig 5

GROUP 18 - VOYAGER 3 - MINERALIZED TUFFS FROM HUDSON RIVER PYROCLASTICS

These samples were analysed to establish if the Hudson River Pyroclastics have a different signature to those of the Wart Hill in light of the unusual signature in Voyager 2. The samples came from DDH 3 in the interval 103.7 to 108.5m.

Sample KR 12701 and 12702 contain 1250 and 1625 ppm Pb and have ratios which are similar to the target as does KR 12705 (with 470 ppm). However, 2 samples from in between KR 12702 and 12705 contain 415 and 475 ppm Pb and are more radiogenic than the target signature.

Assessment - Such isotopic patterns are consistent with that found in low grade mineralization of the target variety.

GROUP 19 - VOYAGER 3 - BARREN VOLCANICS FROM DDH 3

The samples from the interval 73.5 to 96.5m contain from 30 to 70 ppm Pb. All samples, except 12712 have much more radiogenic ratios than the target as might be expected from radioactive decay. Sample 12712 has ratios which are ~0.4% more radiogenic in the 207/206 than the target signature and it is about 7m from the mineralization in Group 18.

Sample KR 12711 has an apparent excess of ^{208}Pb but the others have a uniform Th/U ratio.

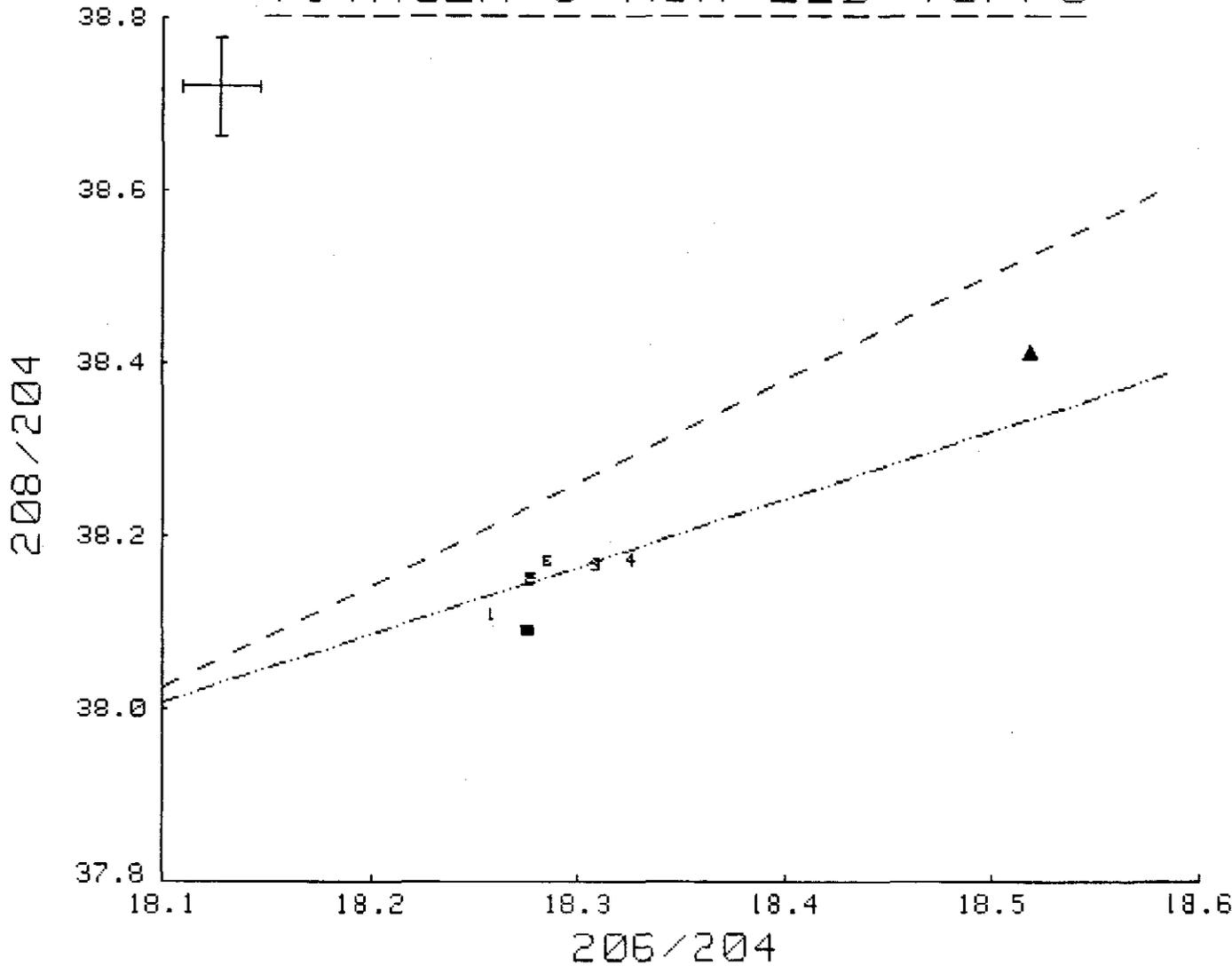
On the 207/206 vs 204/206 plot (Fig. 6) the data define an excellent line with an MSWD of 0.4 and apparent age of ~2 Ga both from the intercept and also intersection with the growth curve.

Assessment - The data from Group 18 and 19 would appear to support the presence of a limited quantity of low-grade mineralization of the target variety. However, the apparently older age of the source material or larger component of older material of ~2 Ga (cf. ~1 Ga for the Wart Hill Pyroclastics and Central Lava Belt volcanics) may be important.

Priority - Low 6/7

COEFF. OF VARIATION= .88408 0 DELETIONS
 SLOPE= .78362 Y INTERCEPT= 23.822 MEAN X= 18.289 MEAN Y= 38.154
 STD DEV OF X= .02472 .1352 % STD DEV OF Y= .024091 .06314 %
 INTERSECTION AT T= .452 X=18.0530 Y=37.9680

VOYAGER 3 MIN'ZED TUFFS

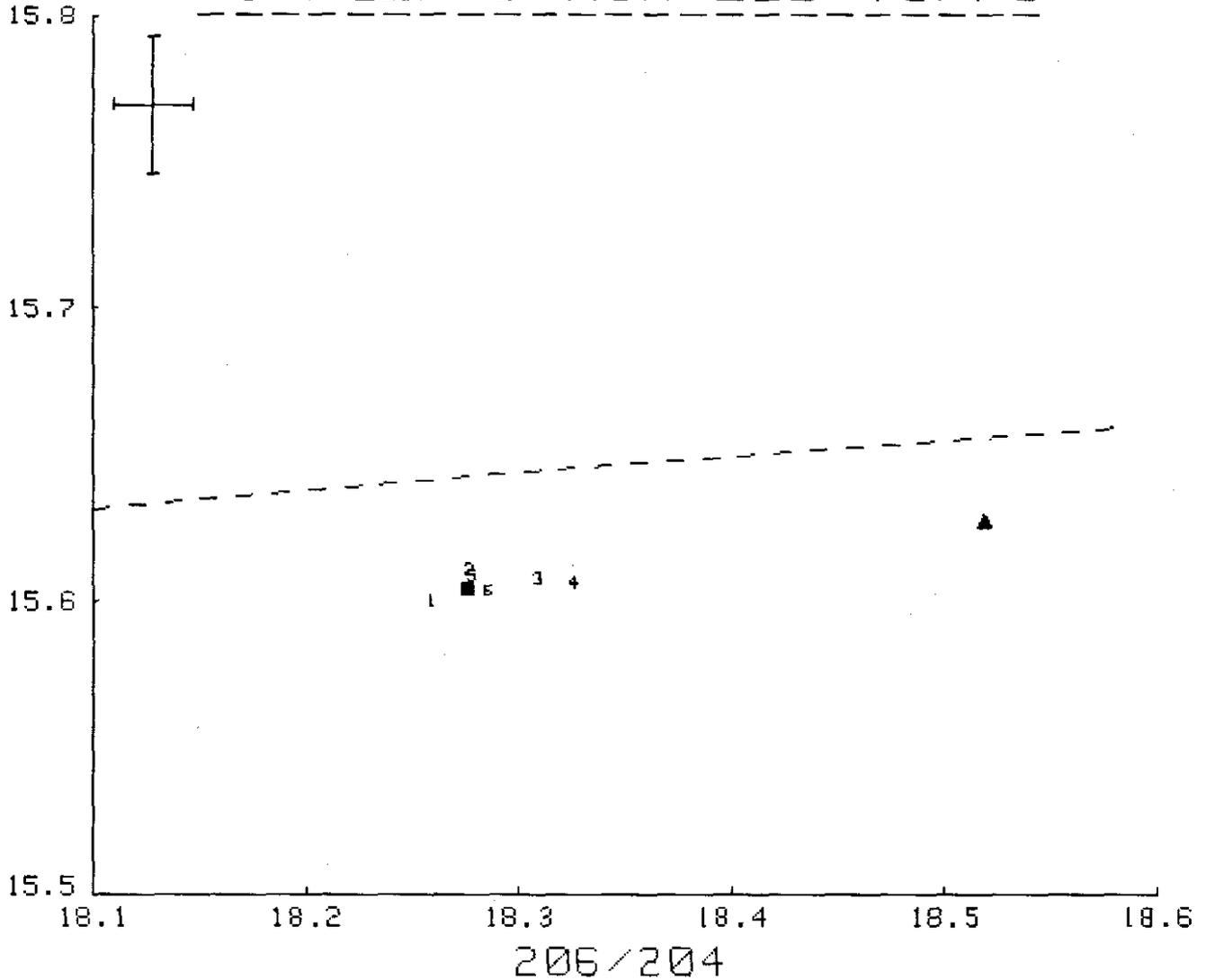


020

052021

COEFF. OF VARIATION= .31887 0 DELETIONS
 SLOPE= .049875 Y INTERCEPT= 14.694 MEAN X= 18.289 MEAN Y= 15.606
 STD DEV OF X= .02472 .1352 % STD DEV OF Y= .0038665 .02478 %
 INTERSECTION AT T= .987 X=17.0910 Y=15.5470

VOYAGER 3 MIN'ZED TUFFS



207/204

206/204

COEFF. OF VARIATION= .99519 0 DELETIONS
 SLOPE= 13.058 Y INTERCEPT= .13793 MEAN X= .054117 MEAN Y= .84402
 STD DEV OF X= .00035462 .6553 % STD DEV OF Y= .0046532 .5513 %

SLOPE= 13.16384+/- .00625 INTERCEPT= .13163+/- .00068
 MSWD= .4

AGE=2.1195+/- .0090 b.y.

INTERSECTION AT T=2.302 X= .0690 Y= 1.0384

VOYAGER 3 BARREN VOLCAN'

207/206

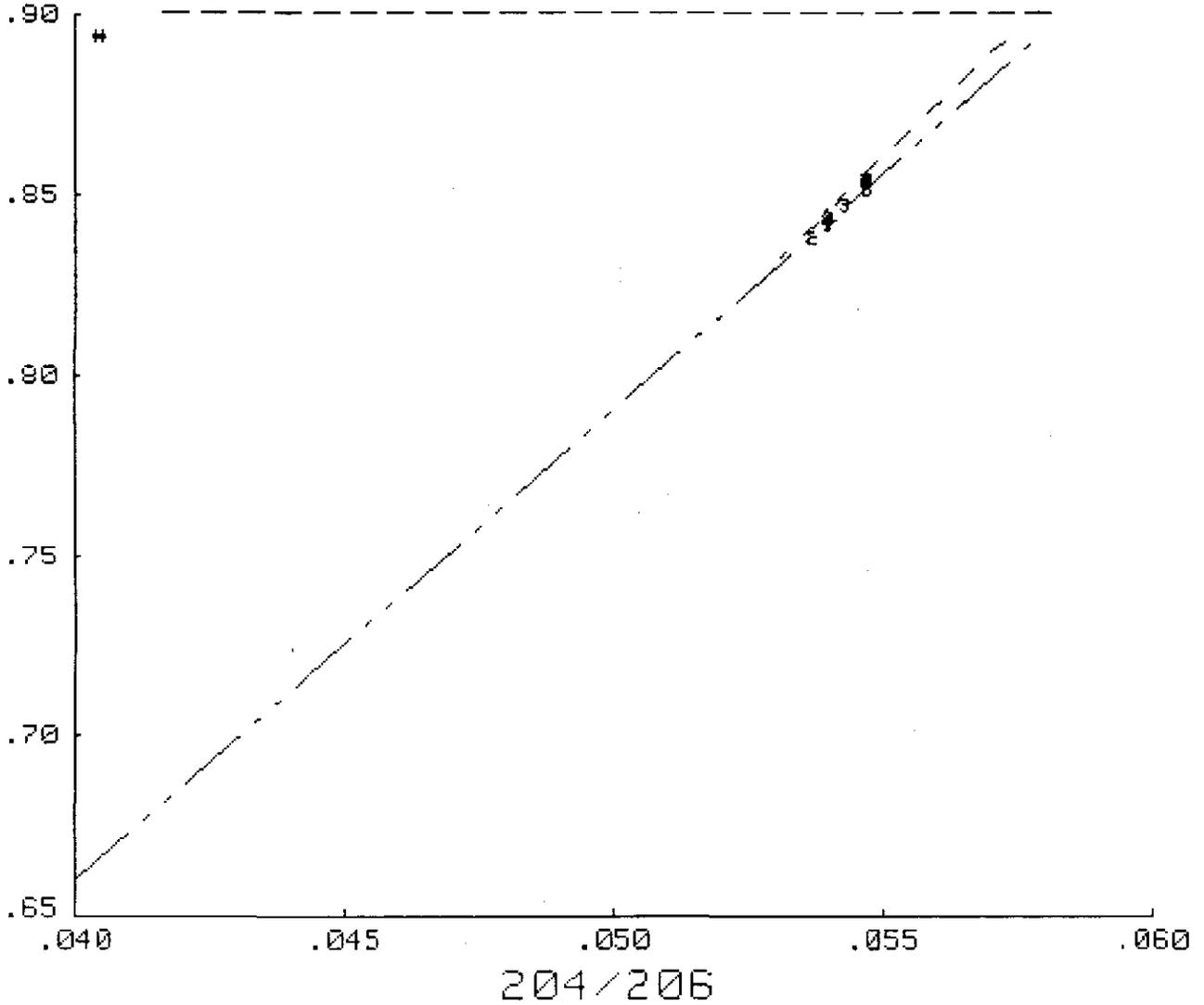
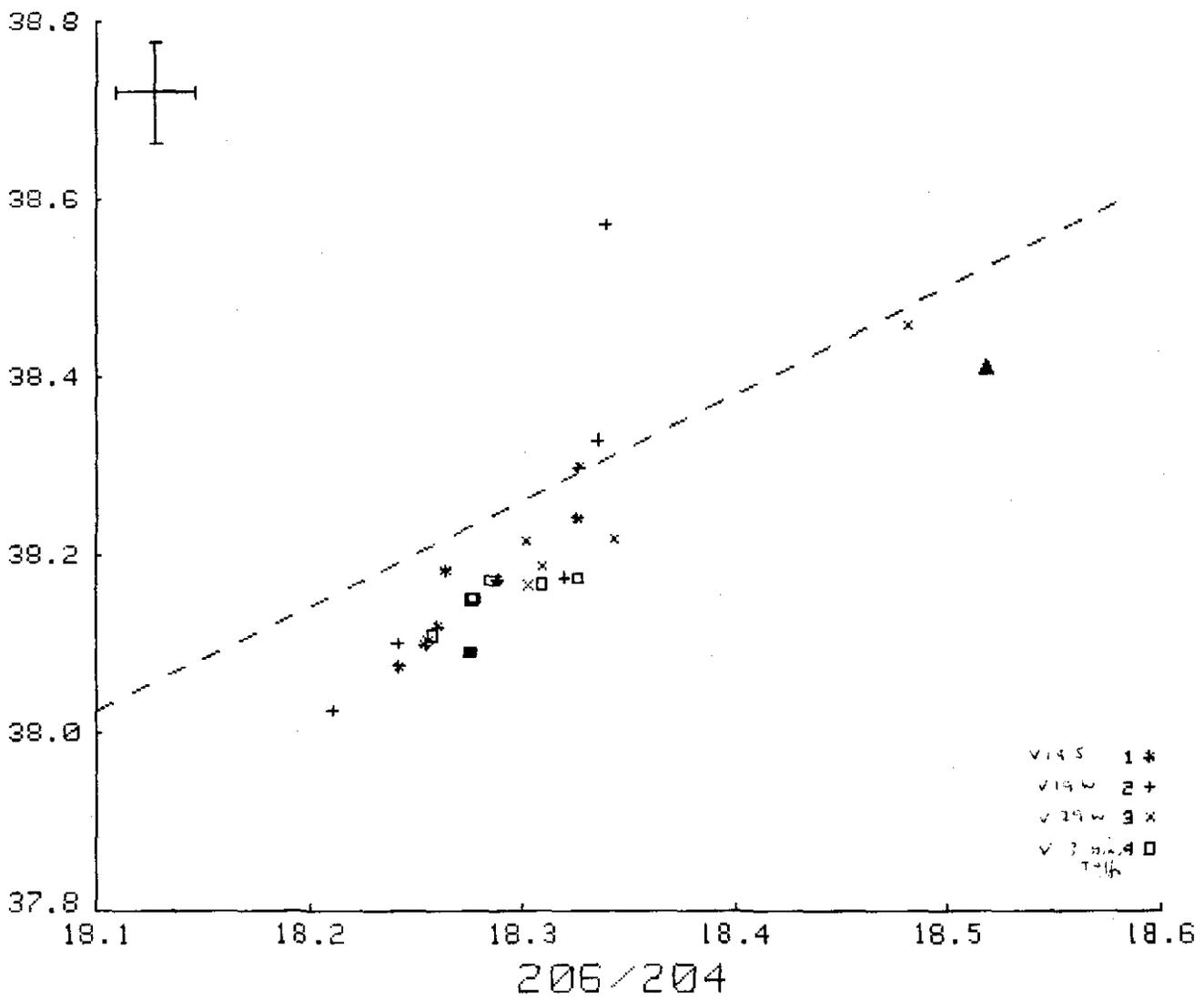


Fig. 6

COEFF. OF VARIATION= .79474 0 DELETIONS
 SLOPE= 1.7994 Y INTERCEPT= 5.2687 MEAN X= 18.298 MEAN Y= 38.194
 STD DEV OF X= .053203 .2908 % STD DEV OF Y= .12046 .3154 %

208/204

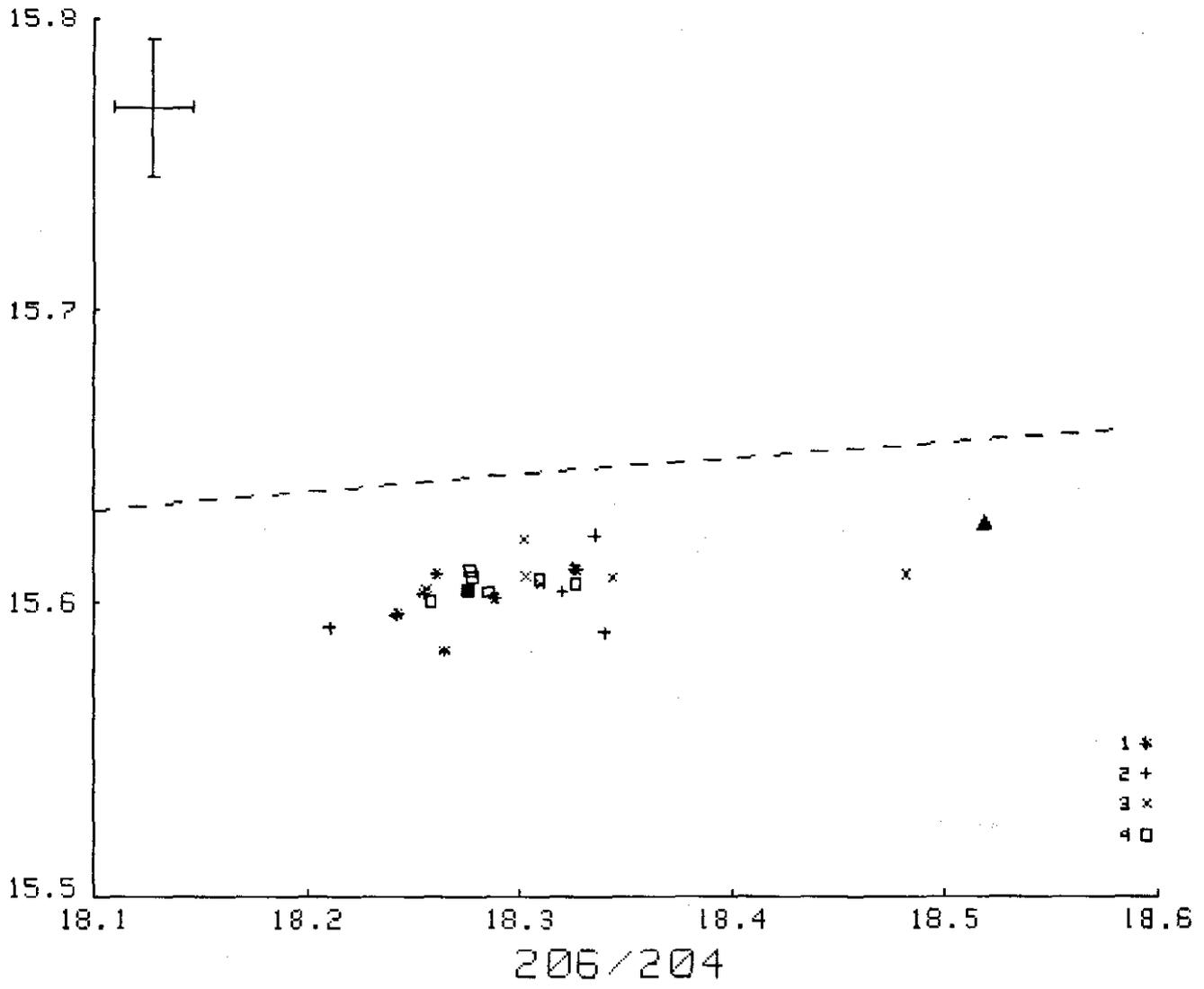


023

052024

COEFF. OF VARIATION= .40409 0 DELETIONS
 SLOPE= .069403 Y INTERCEPT= 14.335 MEAN X= 18.298 MEAN Y= 15.605
 STD DEV OF X= .053203 .2900 % STD DEV OF Y= .0091377 .05856 %

207/204



GROUP 20 - VOYAGER 20 - SOILS

This is the most northerly anomaly in the Wart Hill or Hudson River Pyroclastics. Five samples were analysed from line 10800N, 10225-10400E and one (TS 18025) from 9325N, 10000E.

Samples TS 18025 (2.25% Pb), TS 18168 (1150 ppm Pb) and TS 18170 (935 ppm Pb) have fairly uniform ratios with a 206/204 ratio of 18.19-18.20. The other two samples (TS 18165, TS 18173) have more radiogenic ratios but because of their low Pb concentrations of 135 and 85 ppm, are probably due to radioactive decay.

The ratios in Voyager 20 are similar to those in Group 22 (Voyager 29, West Chargeability anomaly) and Group 33 (Voyager 33 14200N anomaly).

Assessment - The difference in isotopic composition of Voyager 20 and the target indicates that this represents another style of mineralization which has closer affinities with that found in Group 4 (Voyager 2). It is also present in Groups 22 and 33.

Priority - Low >7

025

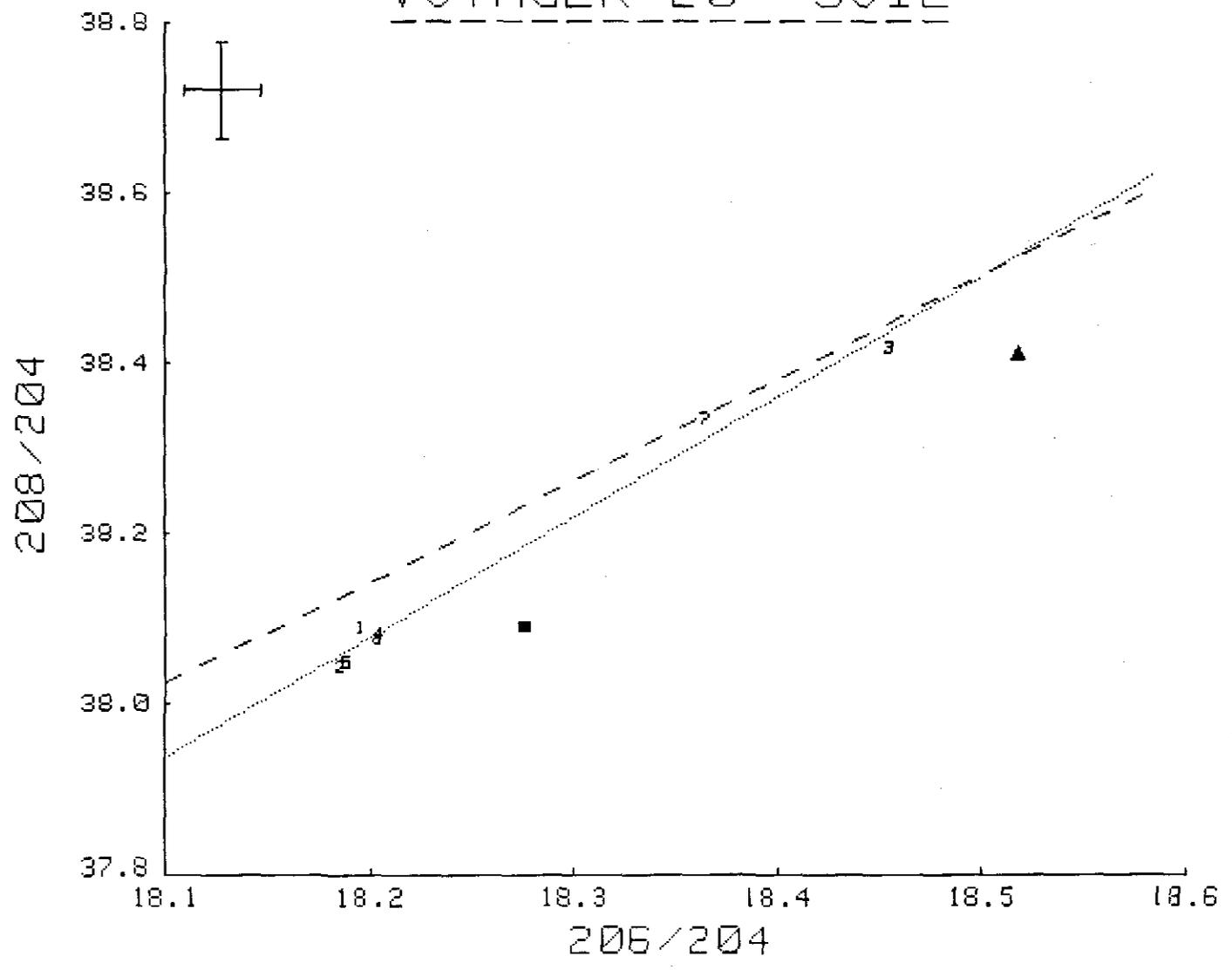
052026

COEFF. OF VARIATION= .99407 0 DELETIONS
 SLOPE= 1.4076 Y INTERCEPT= 12.458 MEAN X= 18.257 MEAN Y= 38.156
 STD DEV OF X= .10836 .5935 % STD DEV OF Y= .15344 .4021 %

SLOPE= 1.41088+/- .00130 INTERCEPT=12.39790+/- .04744
 MSWD= .1

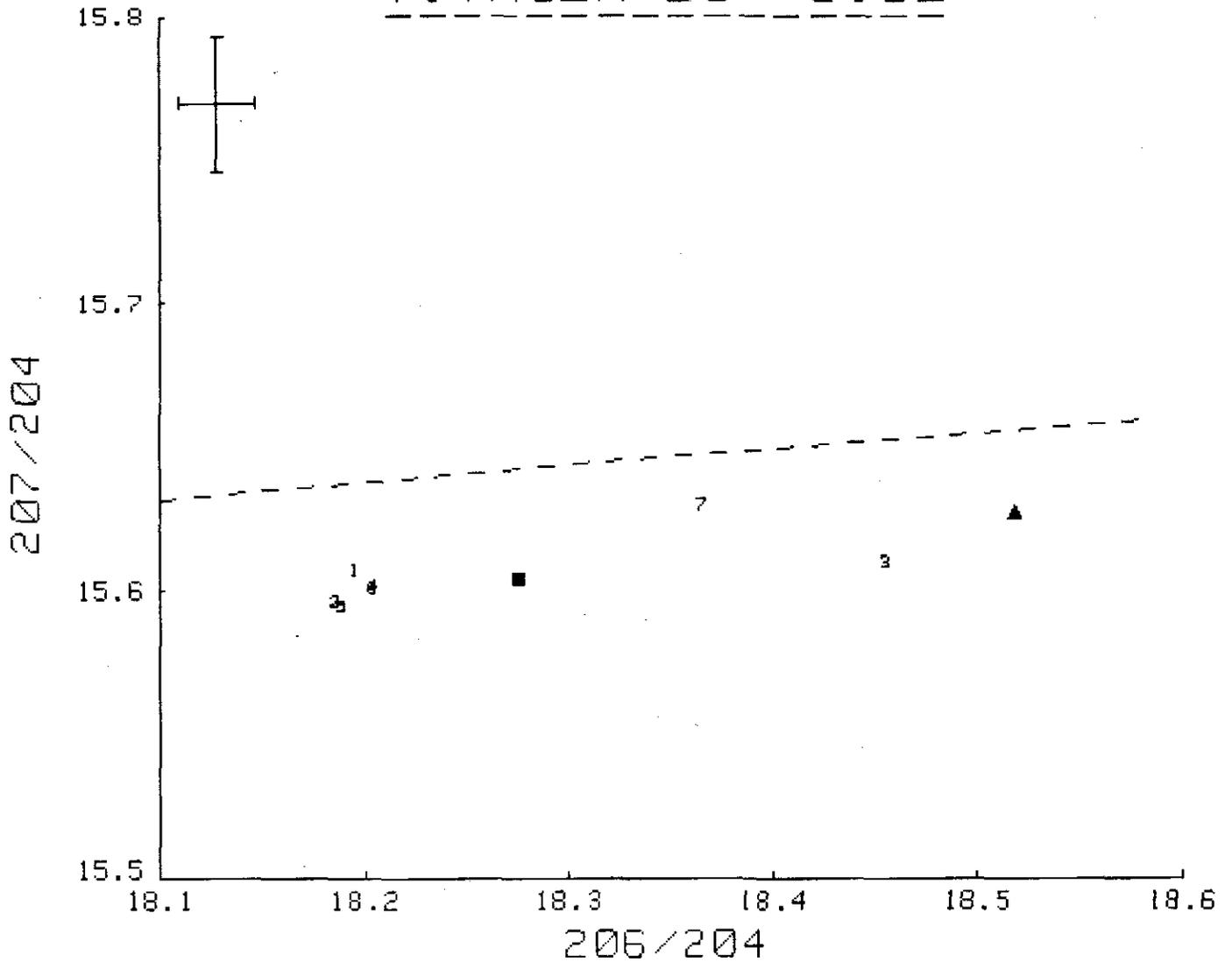
INTERSECTION AT T= .188 X=18.5080 Y=38.5090

VOYAGER 20 SOIL



COEFF. OF VARIATION= .67422 0 DELETIONS
 SLOPE= .074373 Y INTERCEPT= 14.248 MEAN X= 18.257 MEAN Y= 15.606
 STD DEV OF X= .10836 .5935 % STD DEV OF Y= .011953 .07659 %
 INTERSECTION AT T=1.308 X=16.4880 Y=15.4740

VOYAGER 20 SOIL



GROUP 21 - VOYAGER 16 - SOILS IN HUDSON RIVER PYROCLASTICS

All samples come from line 8800N, 9375-9500E.

Sample TS 9562 with 220 ppm has ratios which are slightly more radiogenic than the target of Rosebery but are similar to those of Que River. The other samples have more radiogenic ratios, some of which may be explained by radioactive decay. However, TS 9561 contains 1950 ppm Pb and has a 206/204 ratio of 18.44, more typical of vein mineralization.

Assessment - This anomaly probably arises from a mixture of low grade target mineralization and vein mineralization. Once again, the unusual ratios found in Group 4 (Voyager 2) are not evident in Group 21 (Voyager 16).

Priority - >7

026

052029

VARIATION= .99869 0 DELETIONS

1.4774 Y INTERCEPT= 11.129

MEAN X= 18.396

MEAN Y= 38.308

DEV OF X= .07133

.3877 %

STD DEV OF Y= .10552

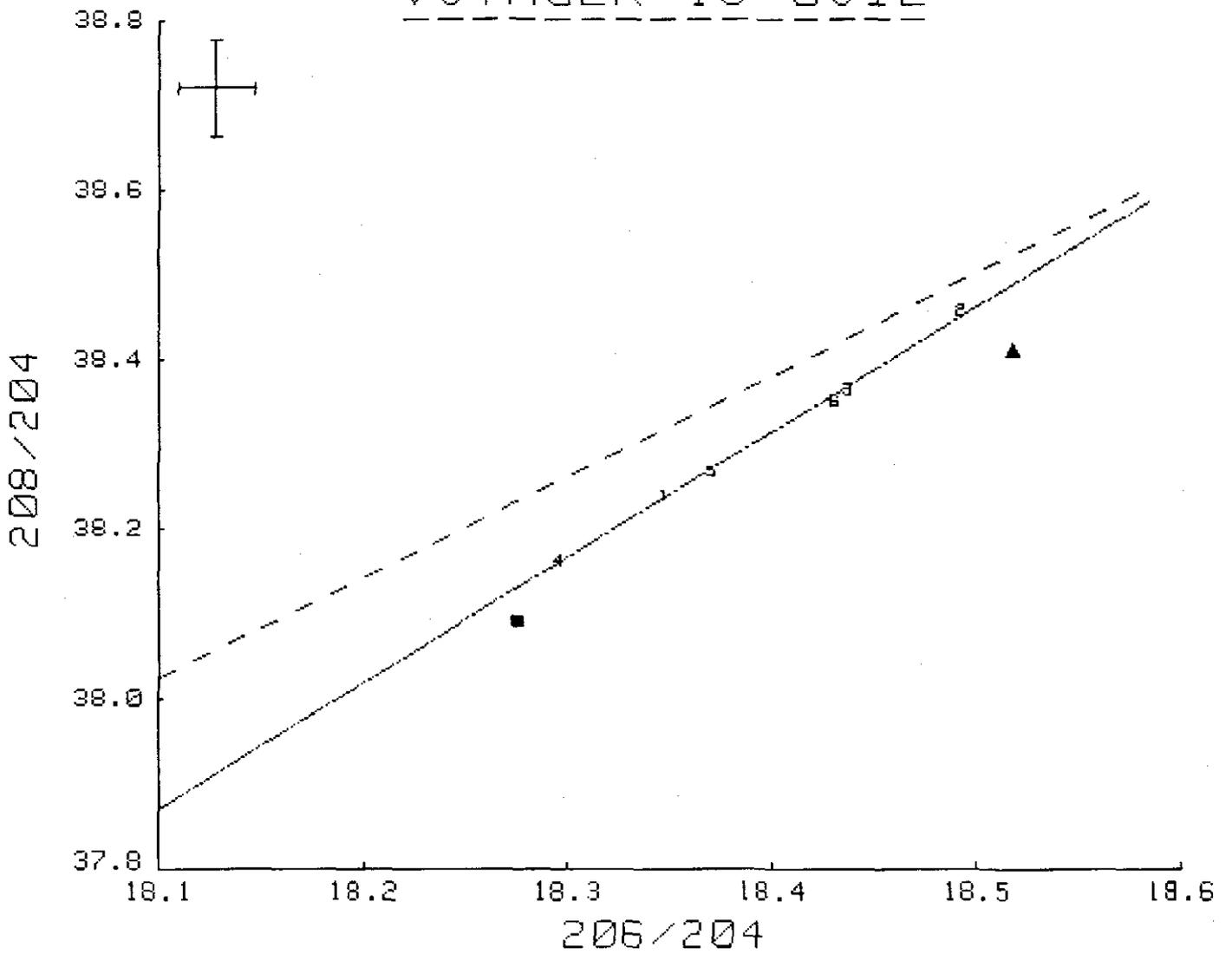
.2755 %

SLOPE= 1.47782+/- .00141
MSWD= .0

INTERCEPT=11.12154+/- .05190

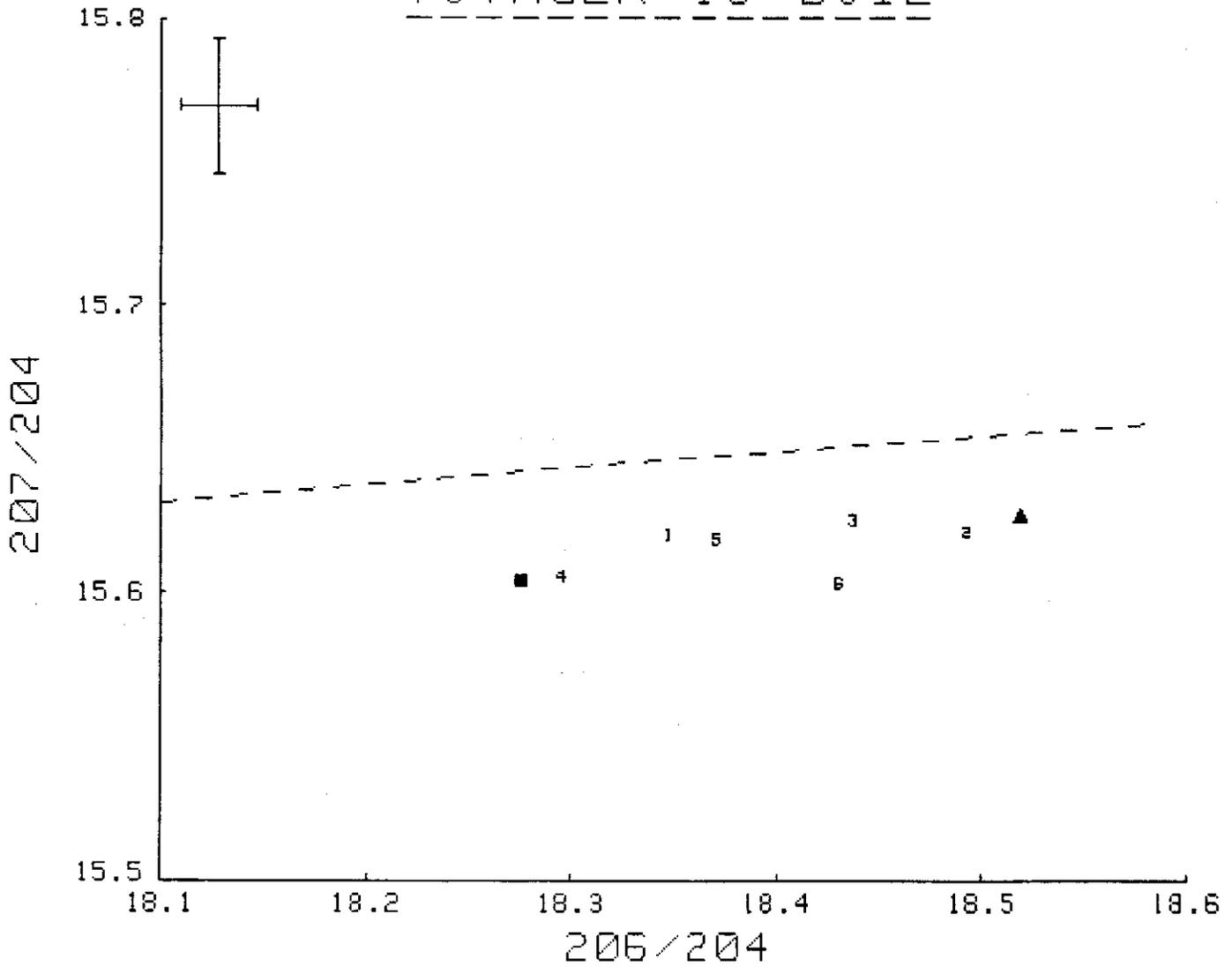
INTERSECTION AT T= .108 X=18.6430 Y=38.6730

VOYAGER 16 SOIL



COEFF. OF VARIATION= .37833 0 DELETIONS
 SLOPE= .048137 Y INTERCEPT= 14.73 MEAN X= 18.396 MEAN Y= 15.616
 STD DEV OF X= .07133 .3877 % STD DEV OF Y= .0090757 .05812 %
 INTERSECTION AT T= .921 X=17.2120 Y=15.5590

VOYAGER 16 SOIL



GROUP 22 - VOYAGER 29 - WEST CHARGEABILITY ANOMALY

The seven samples consist of 1m rock chip/channel samples from a shallow trench on 11400N/9422-9429E, i.e. the same northing as Voyager 29 west soil anomaly (Group 16) and about 400-500m further west.

Except for the two lowest Pb samples KR 13021 and KR 13023 with 170 and 250 ppm respectively, the other samples form a homogeneous population. Even with the inclusion of these two samples the following are the averages and standard deviations:

		<u>Target</u>
208/206	2.0892±0.0006 (±0.028%)	2.0870
207/206	0.8562±0.0005 (±0.054%)	0.8548
206/204	18.217±0.013 (±0.072%)	18.26

That is, the ratios are less radiogenic than the target ratios but are similar to those in Groups 20 (Voyager 20) and 23 (Voyager 33 14200N Chargeability anomaly).

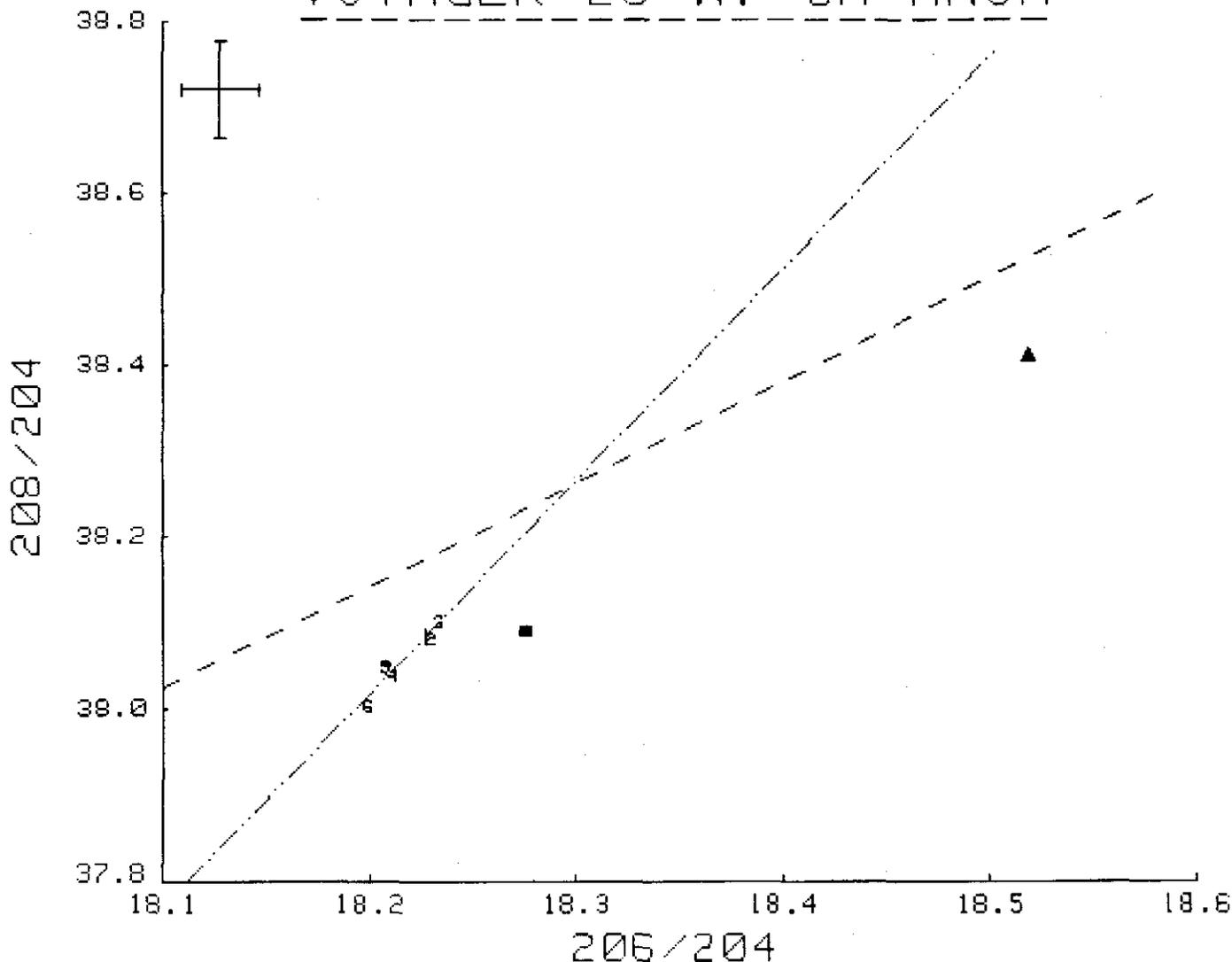
Assessment - The difference in isotopic ratios between this anomaly and the target is discouraging. The ratios are also different to those in Voyager 29 W soil anomaly.

Group 22 samples would appear to derive from another style of mineralization different to that of the target but which also occurs at Voyagers 20 (Group 20) and 33 (Group 23).

Priority - Diffiult to assign as the mineralization has not been intersected but probably >7.

COEFF. OF VARIATION= .96134 0 DELETIONS
 SLOPE= 2.4711 Y INTERCEPT=-6.9579 MEAN X= 18.217 MEAN Y= 38.058
 STD DEV OF X= .013189 .0724 % STD DEV OF Y= .033902 .08908 %
 INTERSECTION AT T= .310 X=18.2990 Y=38.2600

VOYAGER 29 W. CH ANOM

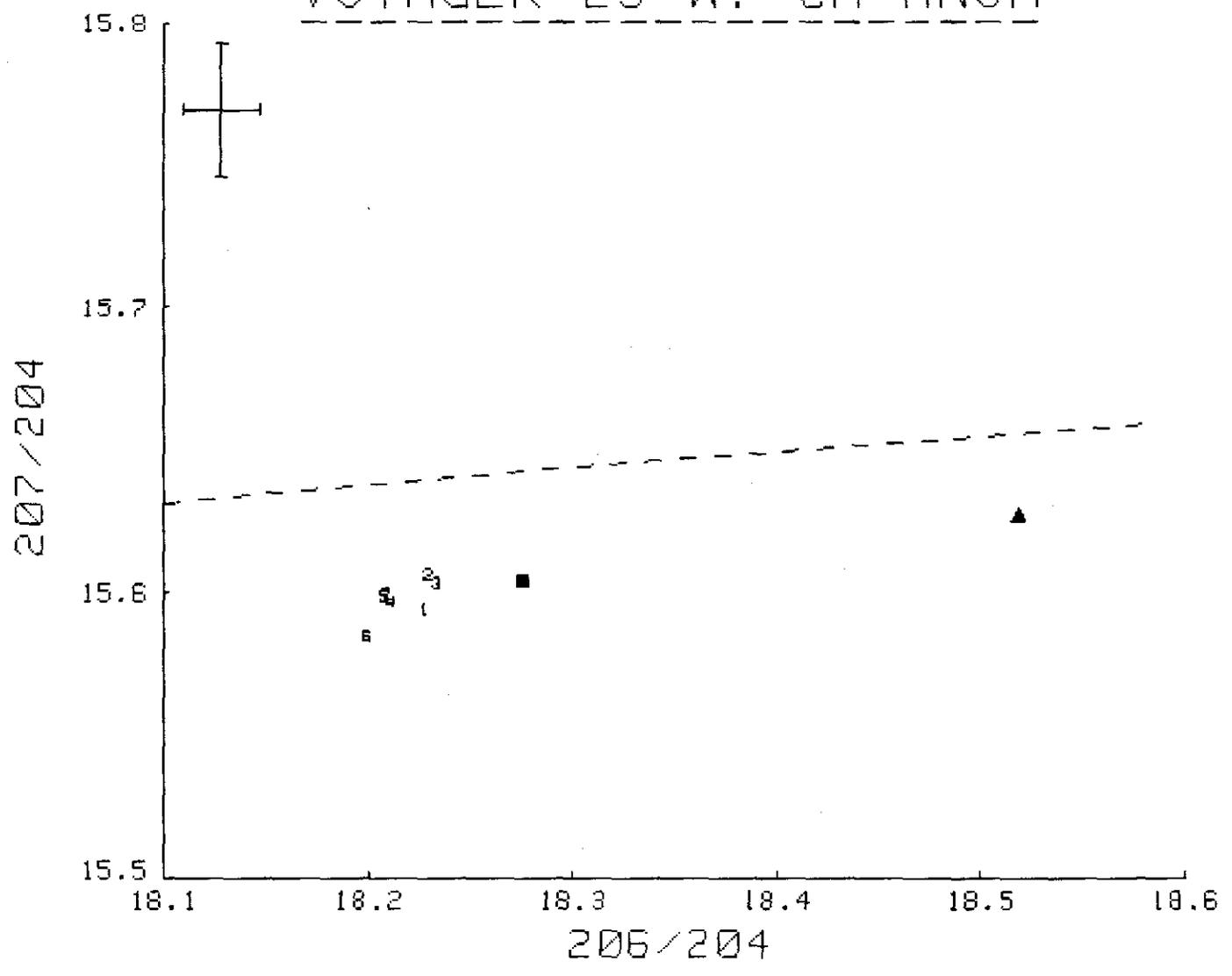


032

052033

COEFFICIENT OF VARIATION= .67635 0 DELETIONS
 SLOPE= .35611 Y INTERCEPT= 9.1106 MEAN X= 18.217 MEAN Y= 15.598
 STD DEV OF X= .013189 .0724 % STD DEV OF Y= .0069441 .04452 %
 INTERSECTION AT T=3.715 X=11.2980 Y=13.1350
 INTERSECTION AT T= .277 X=18.3560 Y=15.6470

VOYAGER 29 W. CH ANOM



GROUP 23 - VOYAGER 33 - 14200N CHARGEABILITY ANOMALY

The six samples consist of 1m channel rock chip samples centred on 9212.5E, 9225E, 9237.5E on 14200N. It is located about 300m E of Group 10 (Voyager 33 soils).

Four of the six samples have isotopic ratios which are almost identical to those in Groups 20 and 22. The other two samples contain ~130 ppm Pb and their ratios may be explained by radioactive decay.

Assessment/Priority - as for Group 22.

It is interesting that Groups 22 and 23 are in the western part of the EL as is Voyager 31 which also has unusual isotopic ratios. From the isotopic data that we have so far and keeping in mind the lack of diamond drilling information, these anomalies would be of less interest than those around Voyager 29.

034

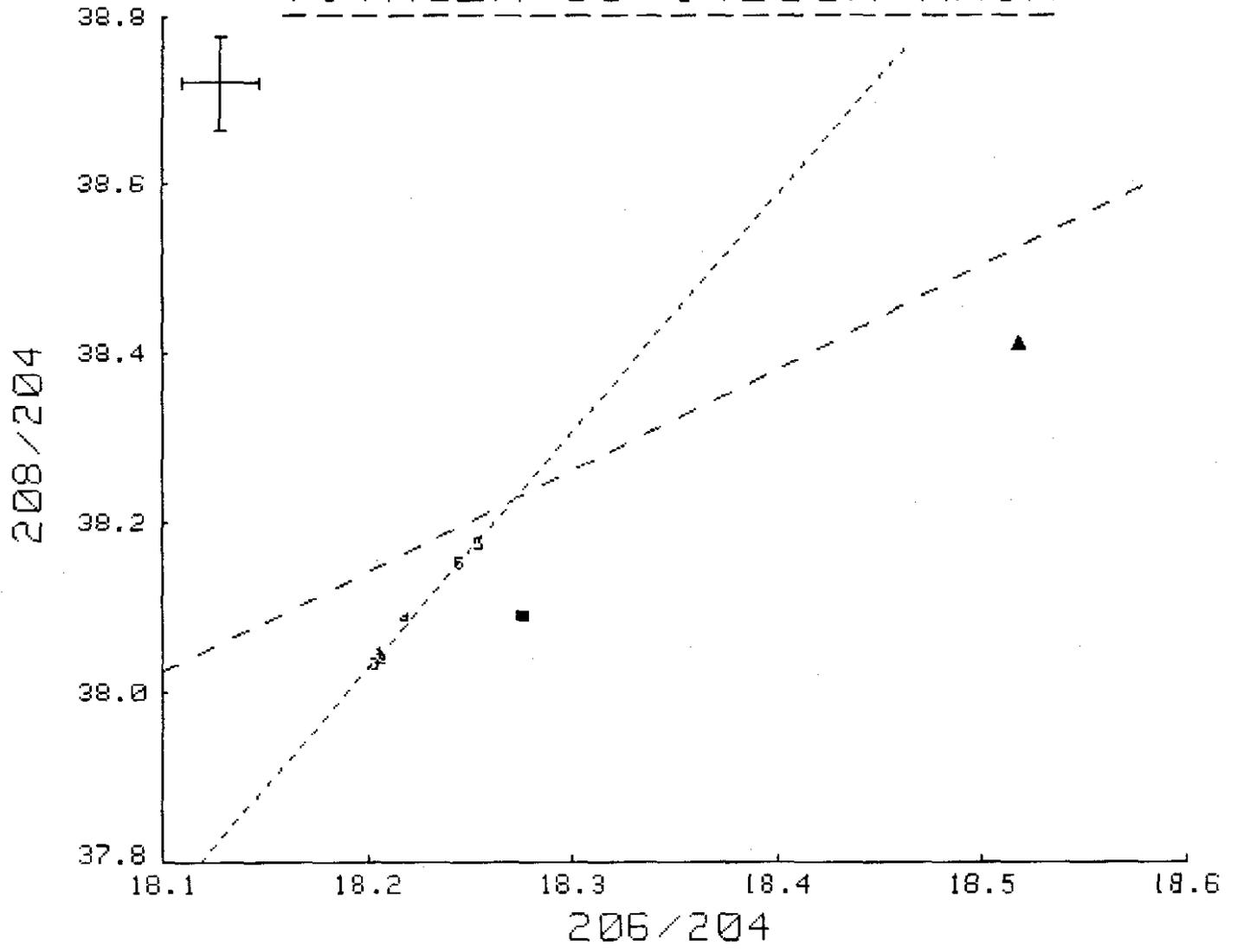
052035

COEFF. OF VARIATION= .99636 0 DELETIONS
 SLOPE= 2.7806 Y INTERCEPT=-12.579 MEAN X= 18.222 MEAN Y= 38.089
 STD DEV OF X= .02194 .1204 % STD DEV OF Y= .061228 .1600 %

SLOPE= 2.78979+/- .00171 INTERCEPT=
 -12.7473557792 2D.5D
 +/- .06244
 MSWD= .0

INTERSECTION AT T= .325 X=18.2730 Y=38.2290

VOYAGER 33 14200N ANOM

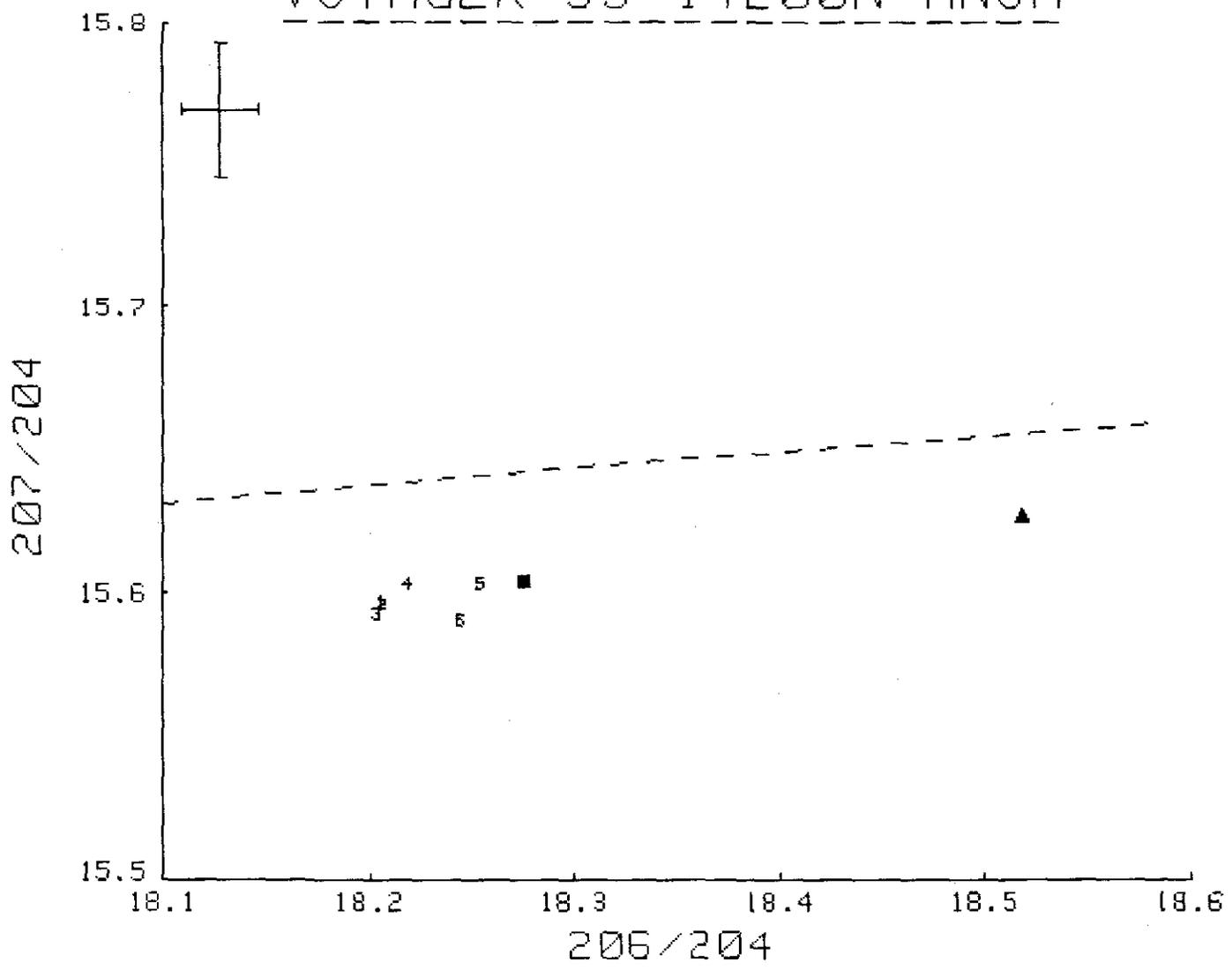


030

052036

COEFF. OF VARIATION= .23688 0 DELETIONS
 SLOPE= .056647 Y INTERCEPT= 14.565 MEAN X= 18.222 MEAN Y= 15.597
 STD DEV OF X= .02194 .1204 % STD DEV OF Y= .0052646 .03375 %
 INTERSECTION AT T=1.120 X=16.8430 Y=15.5190

VOYAGER 33 14200N ANOM



036

052037

GROUP 24 - VOYAGER 34 - NORTHERN SOIL ANOMALY

Previous samples from Voyager 34 (Group 11) were from 13200-13400N, 11725-11900E.

Sample TS 21655 with 4000 ppm Pb has a 206/204 ratio of 18.19, markedly different from the target and similar to Groups 20, 22 and 23.

Samples TS 21622-24 from 13900N have slightly variable ratios; TS 21624 with 1100 ppm Pb has more radiogenic ratios than the other two samples and which resemble those of Que River.

Sample TS 21545 from 13700N and with 1300 ppm Pb has ratios which are similar to TS 21655 and characterising Groups 20, 22 and 23.

Assessment - Except for TS 21624 which has ratios similar to those of Que River (and assuming the concentration of 1100 ppm Pb is correct), the ratios in the other samples would appear to have closer affinities with those in Groups 20, 22 and 23, ie. a style of mineralization different from that of the target. The small variations in TS 21622, 21623 and 21786 are probably due to radioactive decay.

Reassessment of Voyager 34 (Group 11) - A number of samples from Voyager 34 such as TS 17684 (3050 ppm Pb), TS 17688 (2000 ppm Pb) and TS 17693 (3950 ppm Pb) have isotopic ratios which are similar to some of those in the above Group (24) as well as Groups 20, 22 and 23. However, the differences with the target are relatively small but it would definitely appear to represent another style of mineralization.

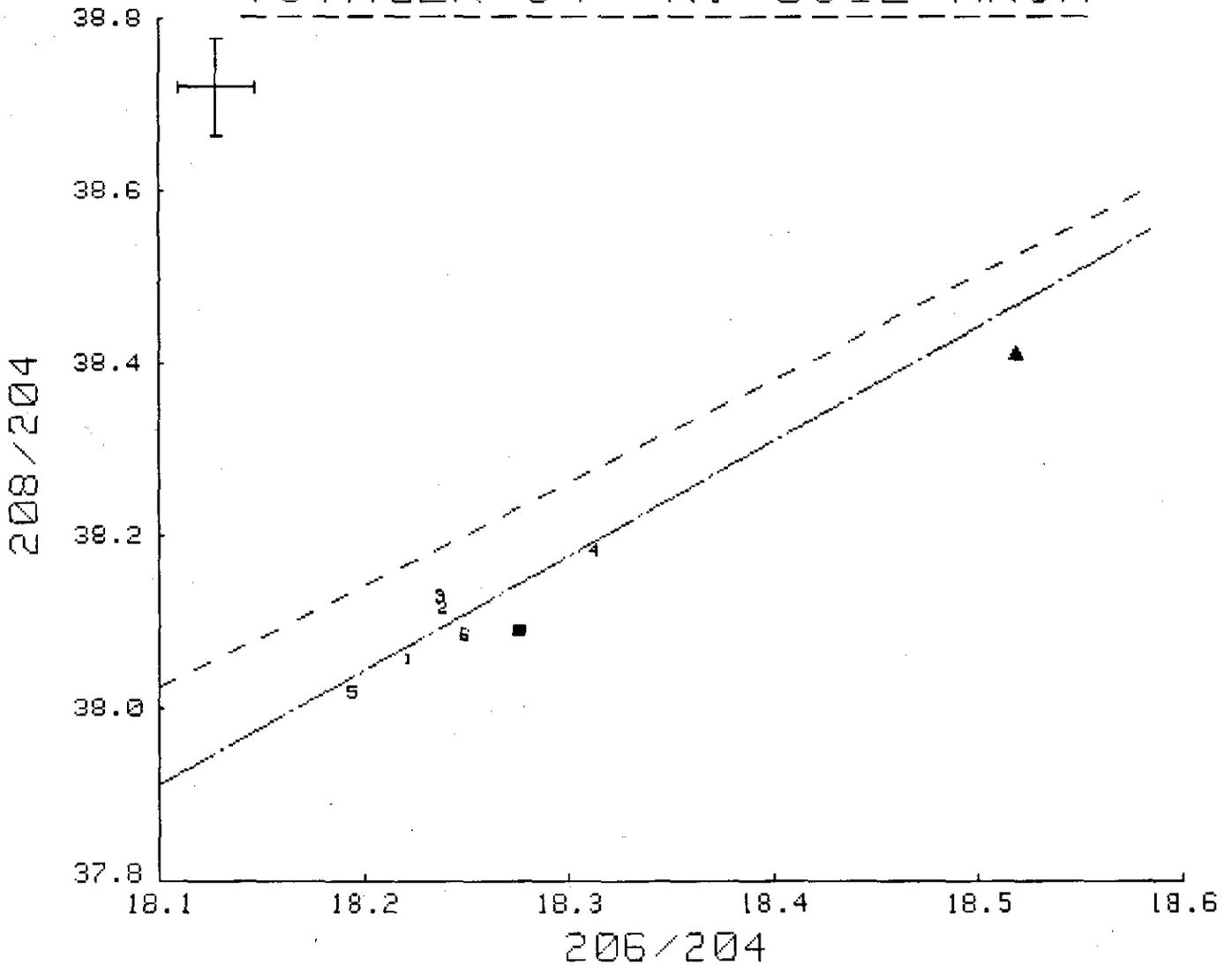
Reassessment of Voyager 9 (Group 12) - The highest Pb sample TS 15256 with 3000 ppm Pb has isotopic ratios which are the same as this Less Radiogenic Style (LRS) with a 206/204 ratio of 18.20. Another sample (TS 15265) contains 1000 ppm and its ratios are similar to the target. However, all the other samples have ratios which could be explained by radioactive decay with the initial Pb being LRS.

037

052038

COEFF. OF VARIATION= .9068 0 DELETIONS
SLOPE= 1.3257 Y INTERCEPT= 13.915 MEAN X= 18.242 MEAN Y= 38.098
STD DEV OF X= .039426 .2161 % STD DEV OF Y= .057638 .1513 %
NO INTERSECTION WITH GROWTH CURVE

VOYAGER 34 N. SOIL ANOM

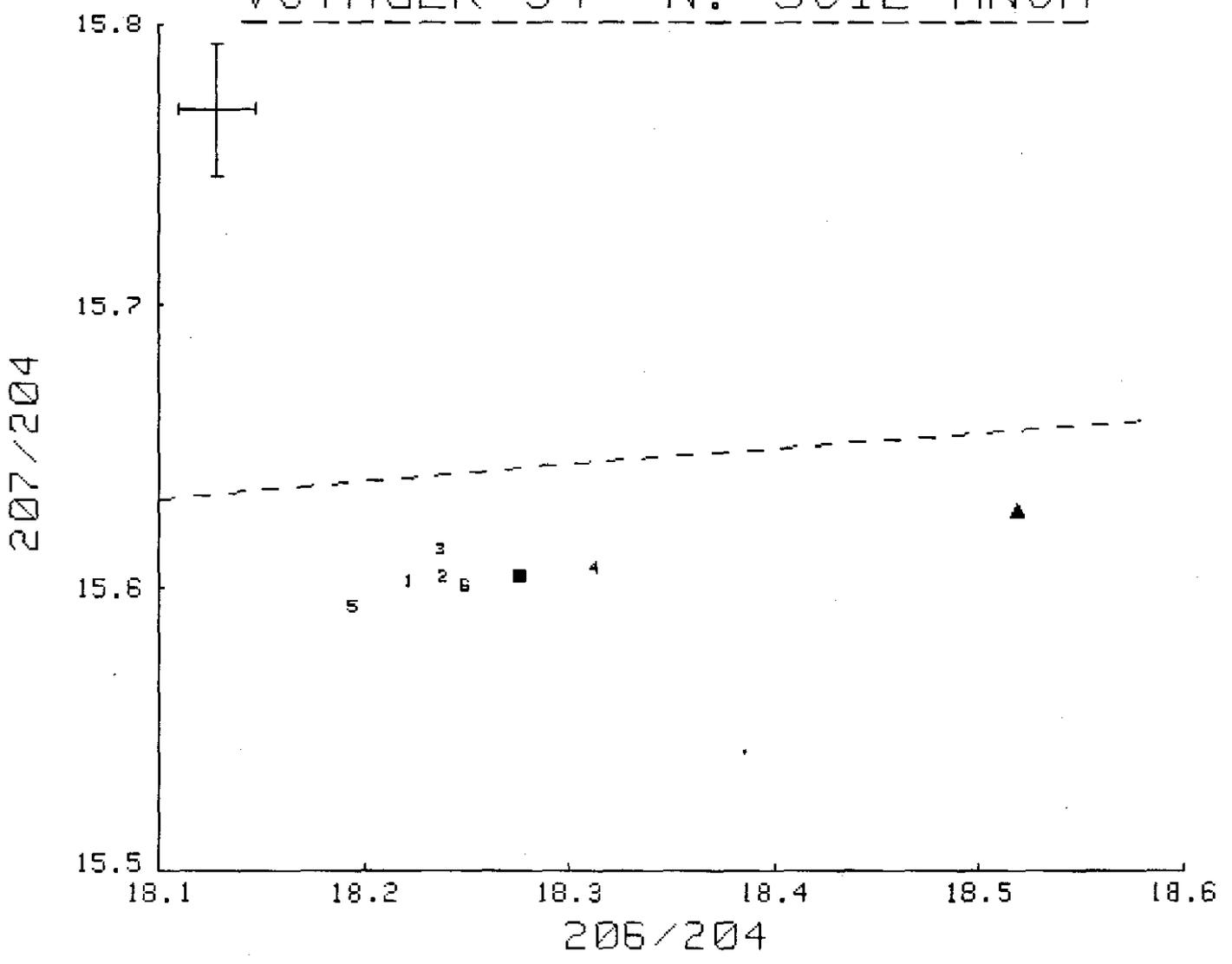


038.

052039

COEFF. OF VARIATION= .51161 0 DELETIONS
 SLOPE= .086709 Y INTERCEPT= 14.022 MEAN X= 18.242 MEAN Y= 15.604
 STD DEV OF X= .039426 .2161 % STD DEV OF Y= .0066819 .04282 %
 INTERSECTION AT T=1.501 X=16.1160 Y=15.4190

VOYAGER 34 N. SOIL ANOM



GROUP 25 - VOYAGER 12 - DDH 5

This group of samples was, once again, to investigate the unusual signature of Voyager 2 (Group 4), in the Hudson River Pyroclastics. Samples are usually those containing the highest amounts of Pb from different depths, ranging from 14 to 107m.

All samples have ratios which are more radiogenic than those in Voyager 2 (206/204 18.16-18.18) but the 3 highest Pb samples have variable isotopic compositions with 206/204 ratios ranging from 18.21 (KR 6508, 3200 ppm Pb) to 18.29 (KR 6587, 4000 ppm Pb) to 18.42 (KR 6559, 1200 ppm Pb).

Assessment - The variable isotopic composition in this anomaly would seem to arise from at least three styles of mineralization.

Priority - >7.

043

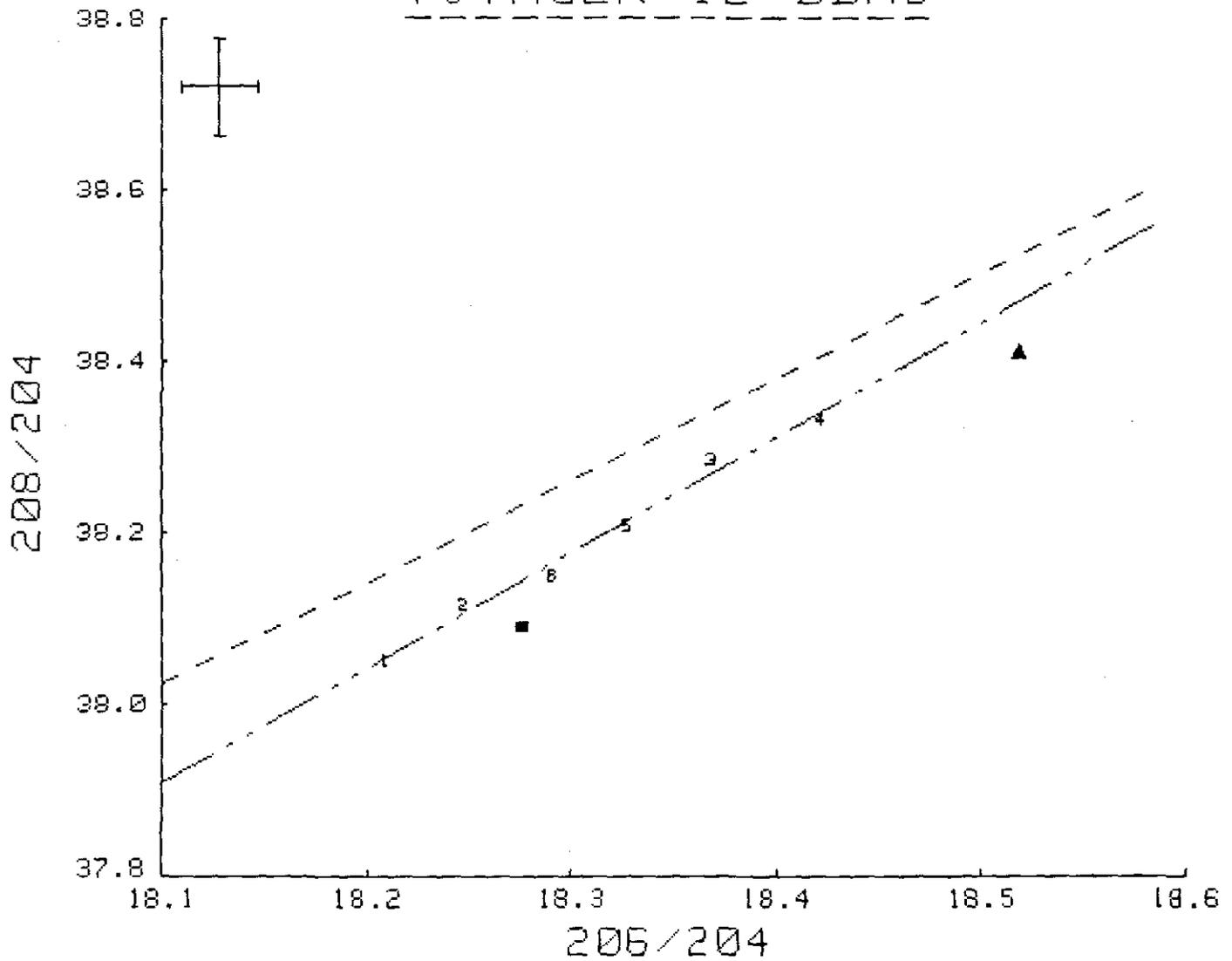
052041

COEFF. OF VARIATION= .99355 0 DELETIONS
 SLOPE= 1.3372 Y INTERCEPT= 13.705 MEAN X= 18.311 MEAN Y= 38.19
 STD DEV OF X= .078804 .4304 % STD DEV OF Y= .10606 .2777 %

SLOPE= 1.33993+/- .00139 INTERCEPT=13.65535+/- .05088
 MSWD= .0

NO INTERSECTION WITH GROWTH CURVE

VOYAGER 12 DDH5

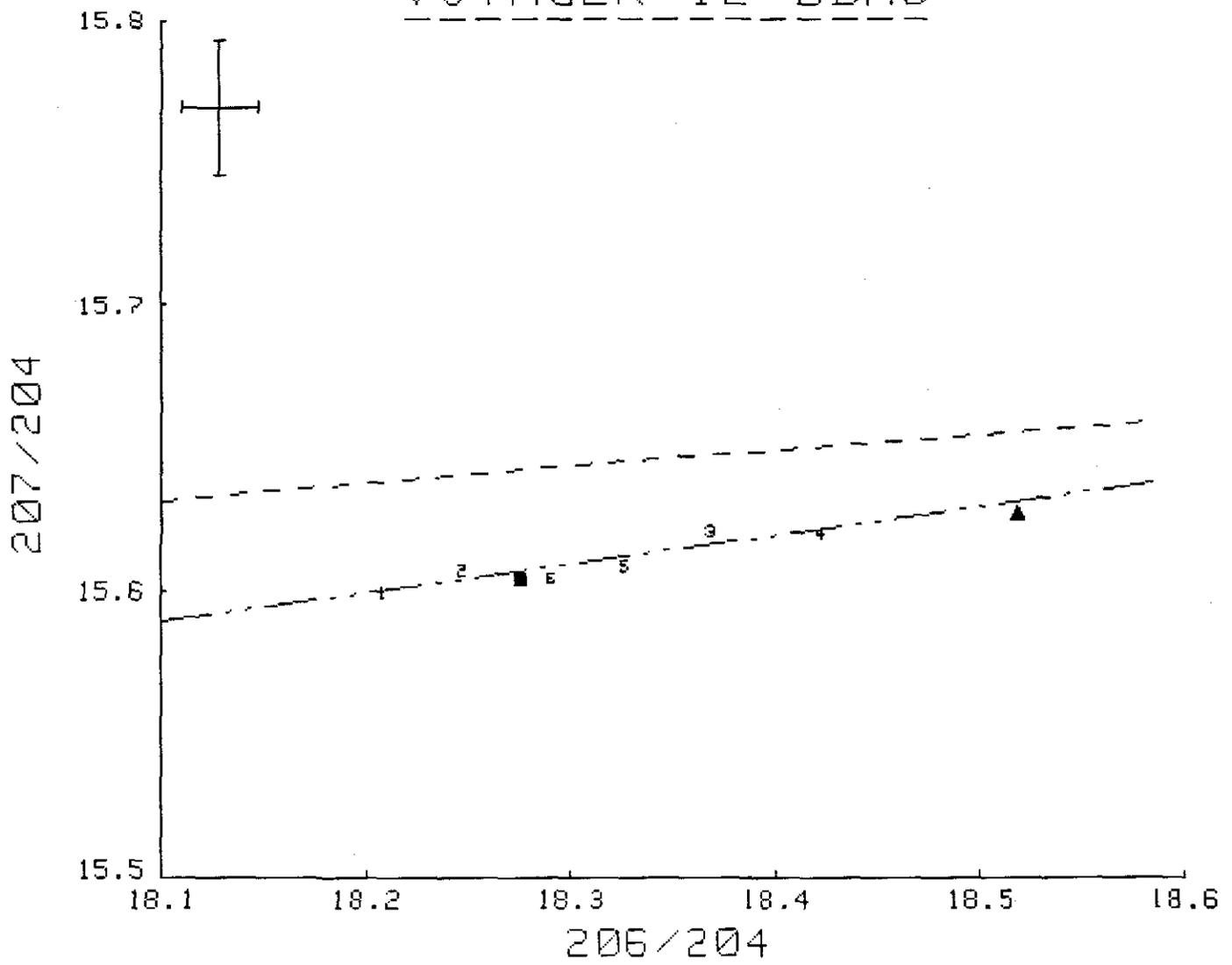


04

052042

COEFF. OF VARIATION= .91387 0 DELETIONS
 SLOPE= .10004 Y INTERCEPT= 13.778 MEAN X= 18.311 MEAN Y= 15.61
 STD DEV OF X= .078804 .4304 % STD DEV OF Y= .0086266 .05526 %
 INTERSECTION AT T=1.698 X=15.7280 Y=15.3520

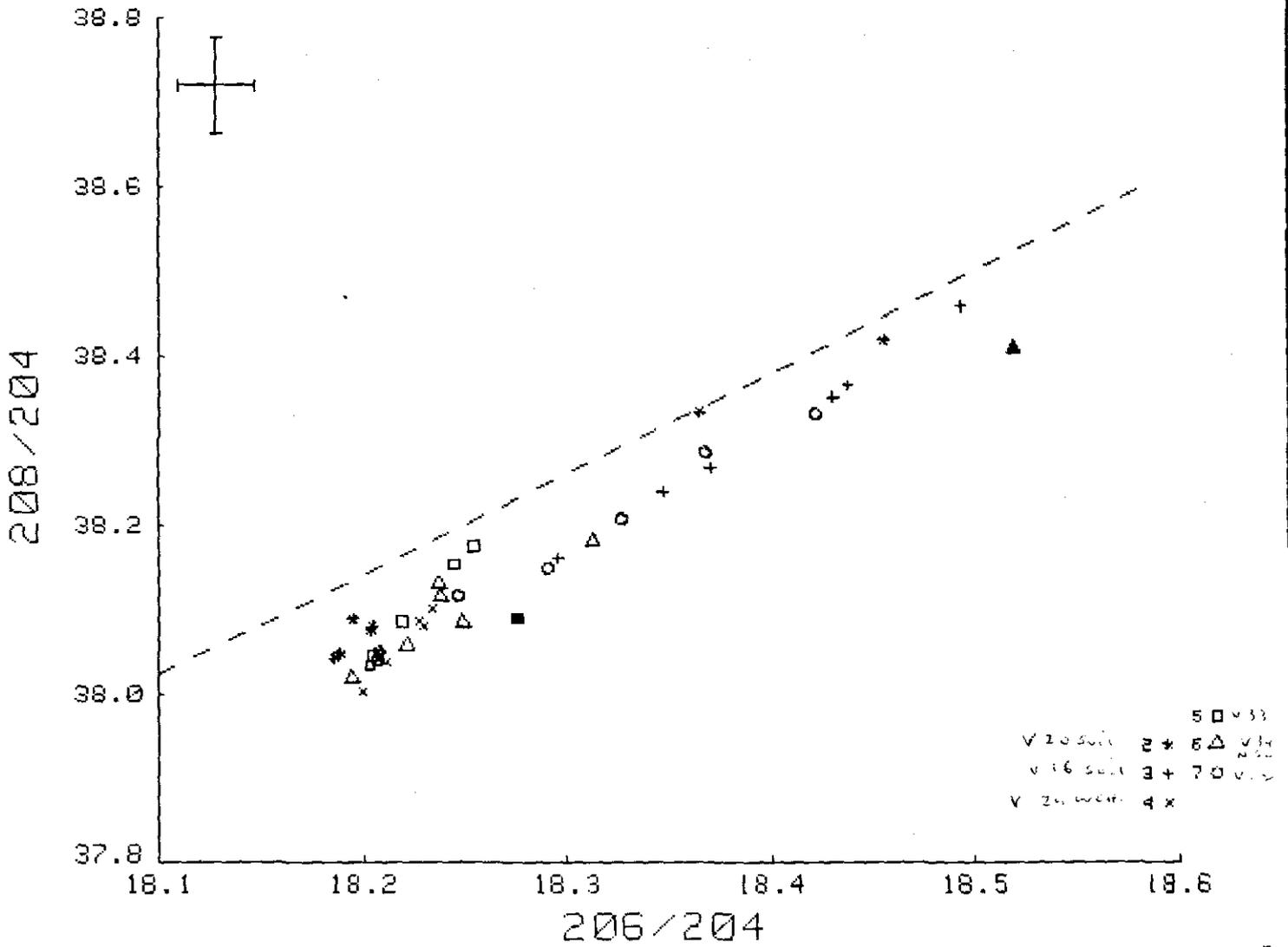
VOYAGER 12 DDH5



042

052043

COEFF. OF VARIATION= .9797 0 DELETIONS
 SLOPE= 1.3688 Y INTERCEPT= 13.138 MEAN X= 18.272 MEAN Y= 38.148
 STD DEV OF X= .087398 .4783 % STD DEV OF Y= .12211 .3201 %

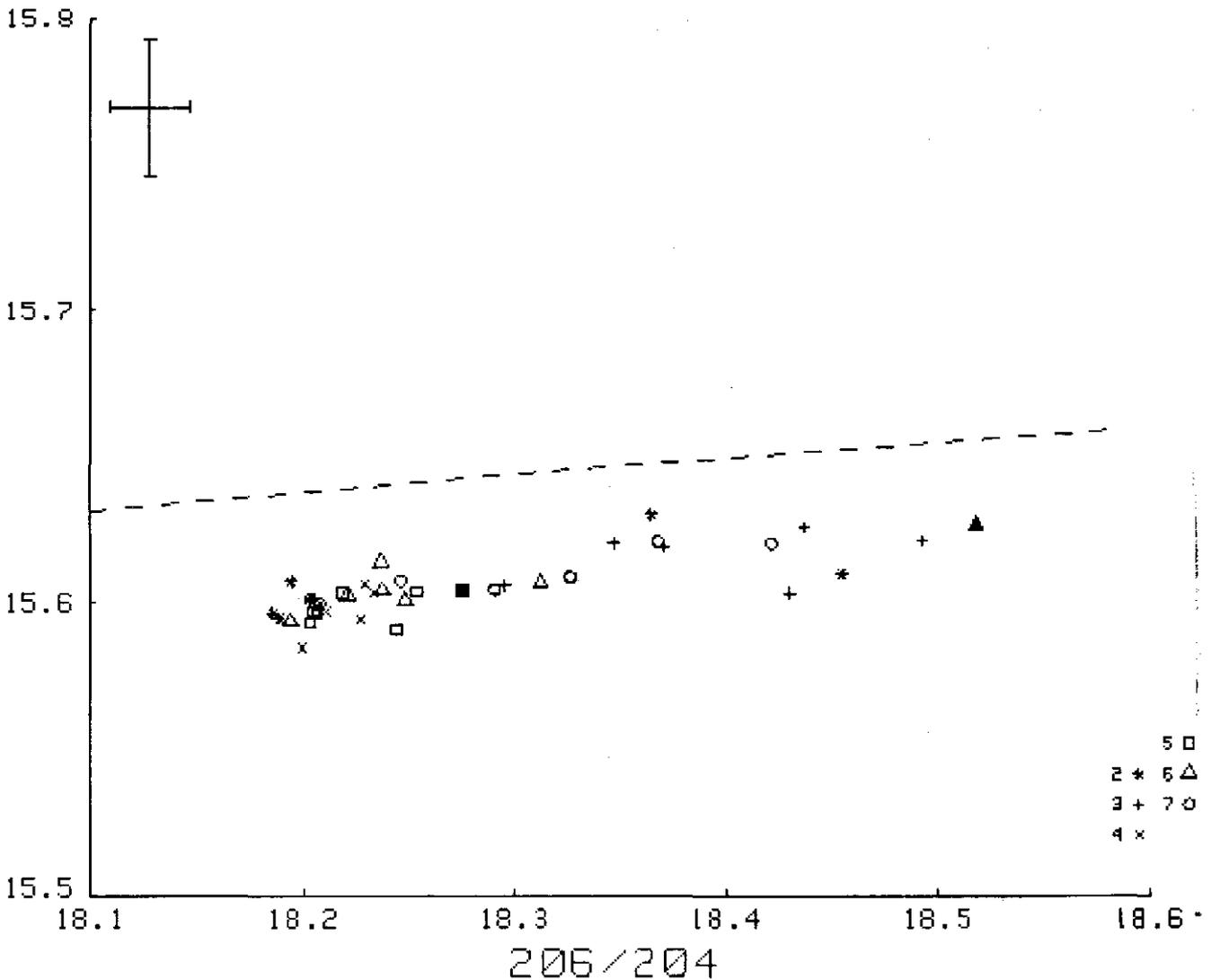


04c

052044

COEFF. OF VARIATION= .76157 0 DELETIONS
 SLOPE= .089512 Y INTERCEPT= 13.969 MEAN X= 18.272 MEAN Y= 15.605
 STD DEV OF X= .087398 .4783 % STD DEV OF Y= .010273 .06583 %

207/204



ISOTOPIIC ANALYSES FROM ELLIOTT BAY.

Sample	208/206	207/206	206/204	207/204	208/204	Pb (ppa)
VOYAGER 19 VOLCANIC ROCK						
V19-1 KR8898	2.0235	0.7752	20.269	15.713	41.015	20
V19-1 KR8974	2.0892	0.8562	18.240	15.617	38.106	6,150
V19-1 KR9022	2.0892	0.8516	18.338	15.617	38.311	410
V19-3 KR9444	2.0673	0.8226	19.007	15.636	39.294	20
V19-3KR10462	2.0731	0.8389	18.607	15.609	38.574	30
V19-4KR10006	2.0916	0.8561	18.210	15.589	38.087	510
V19-4KR10025	1.9795	0.7078	22.375	15.836	44.292	20
VOYAGER 19 SOUTHERN Pb-Zn ANOMALY						
TS 15059	2.0897	0.8518	18.327	15.611	38.298	90
TS 15060	2.0875	0.8548	18.261	15.610	38.119	1,500
TS 15061	2.0871	0.8548	18.255	15.603	38.098	1,500
TS 15062	2.0871	0.8549	18.243	15.596	38.074	890
TS 15063	2.0906	0.8532	18.265	15.583	38.183	890
TS 15064	2.0872	0.8531	18.289	15.601	38.173	200
TS 15089	2.0868	0.8519	18.326	15.612	38.242	175
VOYAGER 19 WESTERN Pb-Zn ANOMALY						
TS 9702	2.1031	0.8500	18.340	15.590	38.571	55
TS 9703	2.0881	0.8562	18.211	15.591	38.025	135
TS 9704	2.0887	0.8549	18.242	15.596	38.101	305
TS 9705	2.0838	0.8517	18.320	15.604	38.175	1,500
TS 10506	2.0904	0.8521	18.336	15.623	38.329	40
VOYAGER 29 WESTERN Pb-Zn ANOMALY						
TS 15336	2.0857	0.8524	18.310	15.606	38.188	310
TS 15367	2.0834	0.8509	18.344	15.609	38.219	175
TS 16513	2.0880	0.8535	18.303	15.622	38.215	250
TS 16515	2.0872	0.8548	18.256	15.605	38.104	1,200
TS 16516	2.0809	0.8446	18.482	15.610	38.459	80
TS 16517	2.0852	0.8528	18.303	15.609	38.166	565
VOYAGER 30 BARREN GRANITE						
TS 16875	2.0473	0.8042	19.486	15.671	39.894	25
TS 16877	1.8252	0.7064	22.406	15.828	40.895	30
TS 16878	2.0547	0.8288	18.869	15.639	38.770	90
TS 16879	2.0152	0.8173	19.159	15.659	38.609	95
TS 16880	1.9667	0.7833	20.059	15.712	39.450	30
VOYAGER 3 MINERALIZED TUFFS						
KR 12701	2.0872	0.8544	18.258	15.600	38.109	1,250
KR 12702	2.0874	0.8541	18.277	15.611	38.150	1,625
KR 12703	2.0845	0.8524	18.310	15.608	38.167	415
KR 12704	2.0830	0.8516	18.326	15.607	38.174	475
KR 12705	2.0873	0.8540	18.278	15.609	38.151	470
KR 12706	2.0875	0.8534	18.285	15.604	38.171	120
VOYAGER 3 BARREN VOLCANICS						
KR 12707	2.0764	0.8427	18.521	15.607	38.456	40
KR 12708	2.0725	0.8382	18.622	15.609	38.594	45
KR 12709	2.0781	0.8471	18.417	15.602	38.272	60
KR 12710	2.0721	0.8426	18.517	15.602	38.369	70
KR 12711	2.0812	0.8420	18.525	15.598	38.555	30
KR 12712	2.0819	0.8516	18.272	15.559	38.039	30
REFERENCE POINTS						
HERCULES	2.0842	0.8538	18.276	15.604	38.091	
QUEEN HILL	2.0740	0.8438	18.519	15.626	38.408	

045.

052046

ISOTOPIIC ANALYSES FROM ELLIOTT BAY.

Sample	208/206	207/206	206/204	207/204	208/204	Pb (ppm)
VOYAGER 20 SOIL						
TS 18025a	2.0935	0.8578	18.195	15.607	38.090	22,500
TS 18025b	2.0920	0.8576	18.186	15.597	38.043	22,500
TS 18165	2.0817	0.8458	18.456	15.610	38.419	135
TS 18166	2.0919	0.8570	18.204	15.602	38.081	505
TS 18168	2.0919	0.8574	18.189	15.595	38.049	1,150
TS 18170	2.0917	0.8570	18.204	15.601	38.077	935
TS 18173	2.0873	0.8511	18.365	15.630	38.334	85
VOYAGER 16 SOIL						
TS 9559	2.0842	0.8513	18.348	15.620	38.240	425
TS 9560	2.0796	0.8447	18.493	15.621	38.459	45
TS 9561	2.0808	0.8475	18.438	15.626	38.366	1,950
TS 9562	2.0858	0.8530	18.296	15.606	38.162	220
TS 9563	2.0831	0.8502	18.371	15.619	38.268	295
TS 9564	2.0809	0.8466	18.431	15.603	38.352	15
VOYAGER 29 WESTERN CHARGEABILITY ANOMALY						
KR 13021	2.0895	0.8555	18.227	15.594	38.087	170
KR 13022	2.0890	0.8561	18.230	15.606	38.082	860
KR 13023	2.0896	0.8557	18.234	15.603	38.101	250
KR 13024	2.0888	0.8565	18.211	15.597	38.039	2,400
KR 13025	2.0898	0.8567	18.207	15.599	38.049	9,600
KR 13026	2.0881	0.8563	18.200	15.585	38.003	440
KR 13027	2.0894	0.8567	18.209	15.599	38.046	1,500
VOYAGER 33 14200N ANOMALY						
KR 13057	2.0898	0.8567	18.205	15.597	38.046	820
KR 13058	2.0893	0.8566	18.207	15.596	38.040	1,200
KR 13059	2.0894	0.8566	18.204	15.593	38.034	720
KR 13060	2.0905	0.8564	18.219	15.603	38.087	750
KR 13061	2.0913	0.8548	18.254	15.604	38.175	140
KR 13062	2.0912	0.8545	18.245	15.591	38.153	125
VOYAGER 34 NORTHERN SOIL ANOMALY						
TS 21545	2.0886	0.8563	18.221	15.603	38.057	1,300
TS 21622	2.0899	0.8556	18.238	15.604	38.117	460
TS 21623	2.0907	0.8561	18.237	15.614	38.130	450
TS 21624	2.0850	0.8523	18.313	15.607	38.183	30
TS 21655	2.0896	0.8571	18.194	15.594	38.018	4,000
TS 21786	2.0870	0.8549	18.249	15.601	38.086	580
VOYAGER 12 DDHS						
KR 6508	2.0898	0.8567	18.208	15.600	38.050	3,200
KR 6513	2.0889	0.8554	18.247	15.607	38.116	760
KR 6553	2.0843	0.8504	18.369	15.621	38.286	500
KR 6559	2.0808	0.8479	18.422	15.620	38.332	1,200
KR 6584	2.0848	0.8517	18.327	15.609	38.207	560
KR 6587	2.0857	0.8531	18.291	15.605	38.150	4,000