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REPORT TO THE SHELL COMPANY OF AUSTRALIA LIMITED ON THE Pb ISOTOPIC COMPOSITION OF SAMPLES FROM DRILL HOLES NEAR HELLYER, WESTERN TASMANIA

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1. INTRODUCTION

The aim of this study has been to determine the Pb isotopic compositions of two drill core samples, 20820 and 20821 from within the Mount Read Volcanics near Hellyer, in western Tasmania. The drill holes are located \approx 10 kms NNE of Hellyer and are about 1 km apart. A lead content of about 420 ppm was indicated for 20821.

Comparisons are drawn between the data for these two samples and the target Pb isotope signatures for Cambrian mineralization hosted by the Mount Read Volcanics. The target signatures for mineralization at Hellyer and Que River, depicted as 95% confidence ellipses, have recently been slightly revised based both on new analyses of Hellyer (SIROTOPE unpubl. data) and on a reappraisal of available data from Que River (Gulson and Porritt, 1987).

Methods of Pb isotope analysis are given in the Appendix.

2. RESULTS

Lead isotope ratios and Pb contents determined by isotope dilution are given in the Table and ratios are plotted in the Figure with reference to the average crustal Pb evolution curve, or growth curve, of Cumming and Richards (1975), and the revised target signatures discussed above.

Duplicate analyses of 20820 (points 1 and 2) agree within experimental error and a Pb content of about 355 ppm is indicated by the isotope dilution data. 20821 (point 3) has a Pb content of about 970 ppm and an isotopic composition which lies along a fractionation trend with respect to the other data and is thus considered to be the same within experimental error. They plot within or very close to the revised 95% confidence ellipse for the Hellyer deposit.

3. ASSESSMENT

These data indicate with a high degree of probability that the sulfide mineralization formed during the same Cambrian hydrothermal event that was responsible for the VHMS mineralization at Hellyer.

4. REFERENCES

Cumming, G.L. and Richards, J.R. (1975). Ore lead isotope ratios in a continuously changing Earth. *Earth Planet. Sci. Letts*, 28, pp. 155-171.

Gulson B.L. and Porritt, P.M. (1987). Base metal exploration of the Mount Read Volcanics, Western Tasmania: Pt. II. Lead isotope signatures and genetic implications. *Econ. Geol.*, 82, pp. 308-327.

TABLE 1. LEAD ISOTOPE DATA FOR SAMPLES FROM PROSPECT NORTH OF HELLYER

Sample	$\frac{208\text{Pb}}{206\text{Pb}}$	$\frac{207\text{Pb}}{206\text{Pb}}$	$\frac{206\text{Pb}}{204\text{Pb}}$	$\frac{207\text{Pb}}{204\text{Pb}}$	$\frac{208\text{Pb}}{204\text{Pb}}$	Pb(ppm)
1 20820	2.0770	0.8486	18.367	15.586	38.149	354
2 20820 R	2.0793	0.8492	18.361	15.592	38.179	359
3 20821	2.0823	0.8504	18.391	15.640	38.296	969

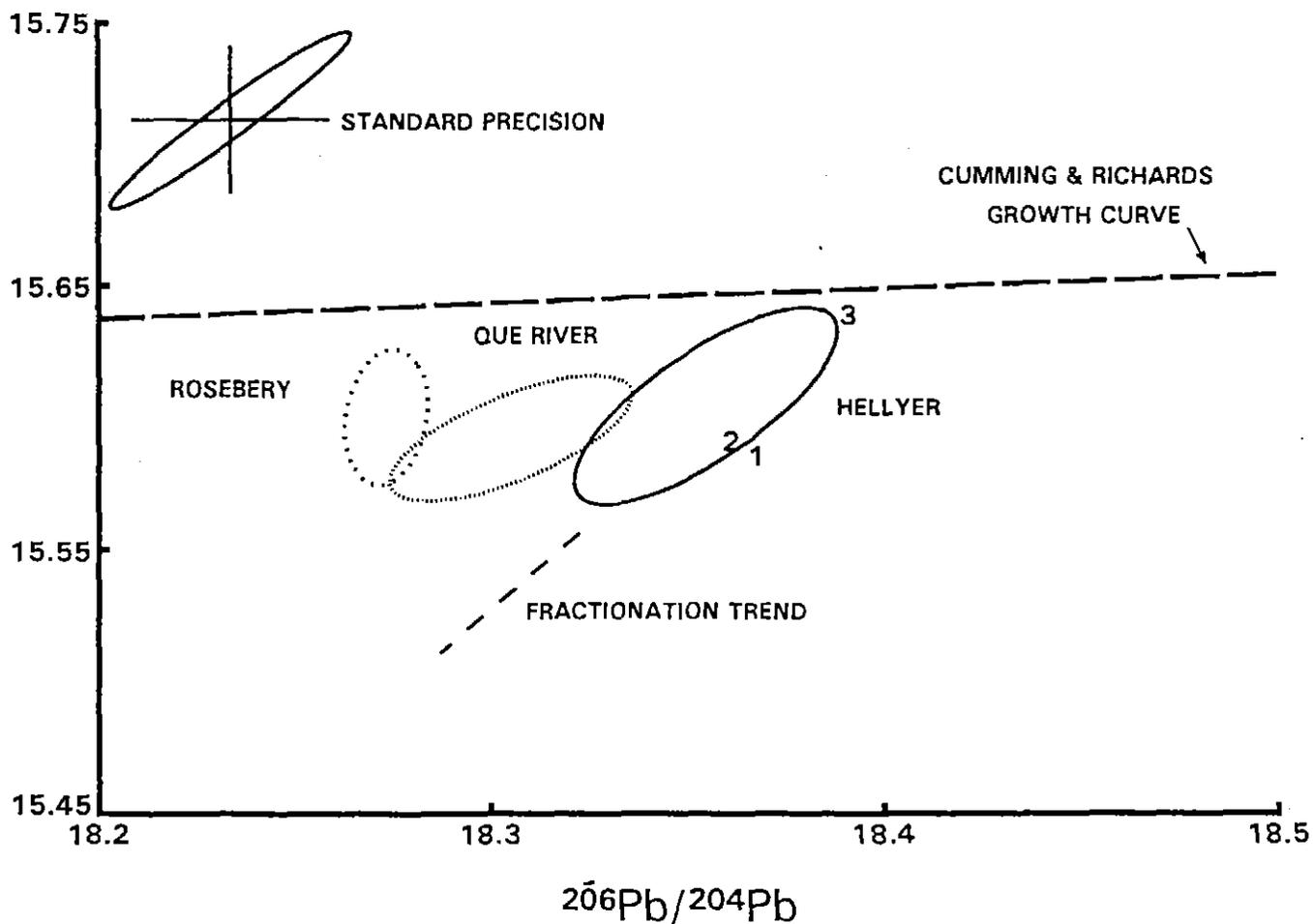
R denotes repeat chemistry

Pb contents determined by isotope dilution

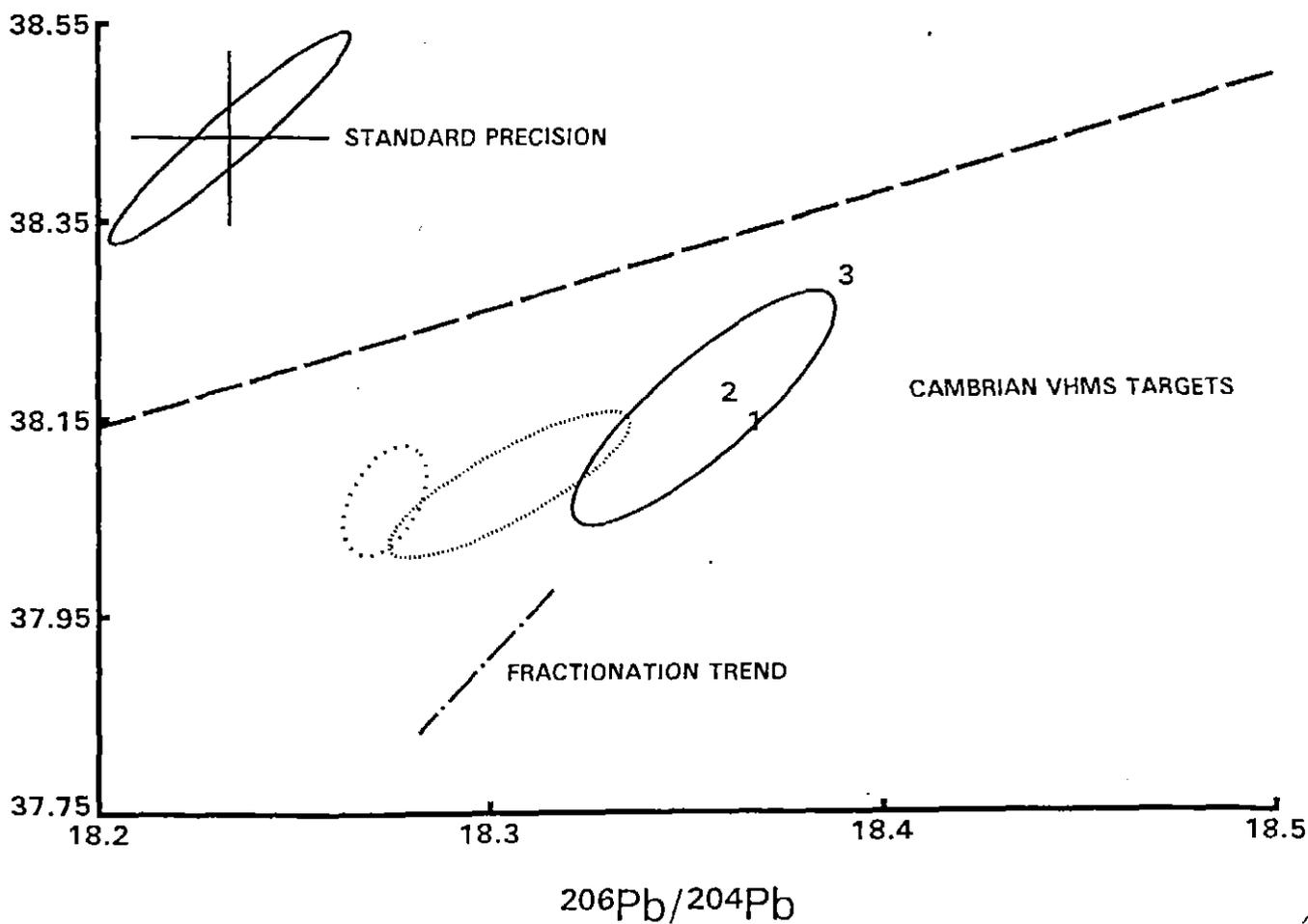
SAMPLE NUMBER PREFIXES REFER TO PLOTTED POINTS FIGURE

PROSPECT NORTH OF HELLYER

207Pb/204Pb



208Pb/204Pb



APPENDIX - LEAD ISOTOPE METHODS.

A representative portion of each mineralized drill core was crushed in a Mn-steel mill. A small amount of each sample was weighed into a teflon beaker along with a known amount of ^{202}Pb spike in order that Pb contents could be determined simultaneously with isotope ratios. They were digested in a hot 1:1 mixture of 7N HCl and 7N HNO_3 acids. Lead was extracted by anion exchange methods in dilute HBr solutions and purified by micro-electrodeposition techniques onto Pt electrodes. 20821 was analysed in duplicate.

Lead isotope ratios were determined on a VG ISOMASS 54E thermal ionization mass spectrometer run in fully automated mode. Results have been normalized to the accepted values of international standard NBS SRM 981 by applying a correction factor of +0.08% per atomic mass unit. Precision estimates, shown as error bars in the upper left hand corner of the accompanying Figures, are based on over 1300 analyses of international standards and natural samples. Also shown are the 95% confidence ellipses for the standard data. Lead contents are precise to within about $\pm 10\%$ for low to moderate Pb samples. However, for high Pb samples (about > 1000 ppm), the measurement of the $^{206}\text{Pb}/^{202}\text{Pb}$ ratio becomes increasingly inaccurate so that the calculated Pb levels are only an approximation.