

**SELECTION OF ELEMENTS FOR DIAGNOSTIC GEOCHEMISTRY
AND REGIONAL/LOCAL CORRELATION OF ALTERED
VOLCANICS, WITH PARTICULAR EMPHASIS ON THE MOUNT
READ VOLCANICS**

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In sequences of altered lavas, it is obvious that different styles of alteration, and variable vein assemblages, produce differing extents and directions of modifications of the primary rock composition. The common vein and alteration minerals and assemblages in Mount Read Volcanic lava sequences, such as calcite, quartz, sericite, chlorite and to a lesser extent pyrite and barite, indicate that SiO₂, CaO and the alkalis (Na, K, Sr, Rb, Ba..) are all mobile to some extent during both regional burial metamorphism, and more localized hydrothermal alteration. Therefore, in assessing the geochemical data from such lava suites with regard to determining primary affinities or making regional or local correlations, due weight should be put on those elements and element ratios which are known to be essentially immobile during such post-eruptive alteration. These so-called immobile elements are those with a high charge to radius ratio, ie. Ti, Nb, Ta, Hf, Zr, Y, P, the rare earth elements (REE), and some other transition elements such as Sc, V, and normally Ni and Cr.

During several years of studying the geochemistry of the Mount Read Volcanics, most recently the thick basalt-andesite sequences in the subsurface west of Hellyer (Rept. for Placer Expln., 1990), I have found that the following elements and ratios are most useful.

1: TiO₂, Zr and Ti/Zr (Ti ppm = %TiO₂ multiplied by 5995). For the Mount Read Volcanics (MRV), and most other suites of arc-related lavas I am familiar with, Nb data is useless, due mainly to its low abundance levels in arc lavas. I suggest that it is not worth the expense of analyzing for Nb. I rarely use Y abundances for diagnostic geochemistry. XRF data seems fairly sloppy, and for the MRV I am not convinced that the primary range of Y warrants using this element as a petrogenetic indicator. Ti/Zr is accurate and apparently very effective in defining magmatic units within a pile of lavas.

2: REE patterns. These cost around \$40-60 per sample, but are of exceptional value in the petrogenetic interpretation of the suites involved, and in correlation of lava units. Due to the expense and time involved in obtaining REE analyses, I have found P₂O₅ abundances to be a useful substitute.