

alteration indices and potassium contents are higher in HL306 reflecting the intensity of sericitic alteration.

These data, coupled with the alteration profile data, suggest that Rb and Rb/Sr may be non-linear steepening toward the core of the deposit and flattening on the outer margin of any given profile toward values for primary rocks. The relatively linear part of this curve is the region of interest in this study in defining a geochemical exploration vector in the distance range of 0.2 to 2 kilometres.

### Discussion

The subset of Hellyer data, filtered through the alteration index, define linear trends with respect to distance from the Hellyer deposit; the gradients of Rb and Sr are better defined than the alteration index alone. The diluting influence of primary whole rock  $^{18}\text{O}$  in weakly altered host rocks, with respect to  $\delta^{18}\text{O}$  in fluid, is likely to preclude the use of  $\delta^{18}\text{O}$  as an alteration mapping tool in the district. Rb and Sr however appear to show much stronger contrast between primary and altered rocks.

The alteration trends described above may be explained as follows:

**Sr.** Primary Sr is selectively removed during alteration due to the leaching of calcium. Some exchange occurs on residual Ca sites and in alteration barite to provide a weak Sr halo around the deposit.

**Rb.** Fixation of potassium as clay-sericite during alteration leads to a systematic change of Rb concentrations (Note that the absolute Rb concentration however increases with distance from the deposit reflecting flushing out of components during wholesale alteration). Alteration sites available in the new assemblage exchange strongly with the bulk fluid.

Since Rb and Sr have been shown to selectively replace K and  $\text{Ca}^{**}$ , it would be possible to argue that their isotope and concentration profiles were entirely generated during a Devonian resetting event with an ambient fluid selectively replacing K and Ca throughout the district. The uniformity of the above trends for the significantly altered rocks ( $\text{AI} > 40$ ) especially with respect to distance from the deposit is hard to accept if

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\*\* Table 2 explores the correlation between alkali and alkaline earth metals, the alteration index and initial strontium isotope data. Strontium isotope ratios have a strong negative correlation with  $\text{K}_2\text{O}$ . The correlations which are highlighted in Table 2 confirm that Rb-Sr isotope systematics are related directly to the primary alteration process in the district.