

Application of $\delta^{18}\text{O}$ to exploration at the Geordie Lake Cu-Pd deposit, midcontinent rift, Canada

GOOD, D. J.¹, WEBB, E.¹, MEGHJI, I.¹, LINNEN, R.¹,
SAMSON, I. M.² AND BANERJEE, N. R.¹

¹Department of Earth Sciences, Western University, Ontario, Canada

²Department of Earth and Environmental Sciences, University of Windsor, Canada

We present results of a comprehensive study of $\delta^{18}\text{O}$ values throughout the Geordie Lake gabbroic intrusion located near the centre of the Proterozoic Coldwell Alkaline Complex. The complex intruded Archean rocks near the beginning of the main stage of midcontinent rift magmatism. The study comprises a total of 200 whole rock and mineral separate analyses for surface and core specimens collected from all gabbroic and underlying syenitic units along the 2.5 km strike length of the intrusion. Preliminary results show a strong spatial correlation between Cu-Pd mineralization and low (1-3‰) $\delta^{18}\text{O}$ values that may be significant in developing a vectoring tool to blind mineralization and to help interpret the petrogenesis of the intrusion and mechanisms of ore formation.

The Geordie Lake intrusion consists primarily of gabbro, olivine gabbro and augite troctolite that is characterized by compositional and textural heterogeneity in the lower half, and a strong plagioclase lineation at the top. Augite troctolite contains skeletal olivine interpreted as a chilled feature. Cu-Pd mineralization is associated with the cross-cutting augite troctolite intrusions and actinolite-albite alteration.

In general, the $\delta^{18}\text{O}$ values of the gabbro decrease down-hole, with minimum values near the syenite contact or within troctolite intrusions, regardless of alteration intensity. Preliminary interpretations of the low (1-3‰) $\delta^{18}\text{O}$ values for augite troctolite suggest they are magmatic, and that subsequent alteration to albite and actinolite further modified the $\delta^{18}\text{O}$ signature.