

The geochemistry of diamond indicator minerals from the Horn Plateau and Trout Lake regions of the NWT Interior Platform

SP Poitras^a, DG Pearson^a, T Stachel^a, and S Cairns^b

^a *Earth and Atmospheric Sciences, University of Alberta, AB, Canada*

^b *Northwest Territories Geological Survey, Yellowknife, NWT, Canada*

The Horn Plateau (HP) and Trout Lake (TL) regions in the Central Mackenzie Valley (CMV), Northwest Territories are located between the western margin of the Slave craton and the Cordillera in the Phanerozoic Western Canadian Sedimentary Basin. Both LITHOPROBE and more recent regional-scale surface wave seismic studies suggest lithospheric mantle extending into the diamond stability field under the CMV. Although Olivut Resources has discovered 29 kimberlites in the CMV, the reported kimberlite indicator mineral (KIM) chemistry of these kimberlites differs from that obtained during regional till and river sampling, suggesting the presence of additional kimberlites. We present new geochemical data on the regional KIMs from these two regions, with the aim of constraining possible geotherms, defining depth of mantle sampling and emplacement ages.

In total, ~3600 HP and ~640 TL KIMs were picked from the 0.25-2.0 mm size fractions. A sub-sample of ~3100 HP and ~500 TL KIMs were analyzed by electron probe microanalysis (EPMA). Assuming for each region KIMs were derived from common mantle sources, geotherms were constructed using single grain clinopyroxene geothermobarometry. Laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) of ~700 HP and ~170 TL peridotitic garnet grains yielded Ni-in-garnet temperatures ranging from ~800-1350 °C. supporting these results are temperature estimates based on Al-in-olivine geothermometry from LA-ICP-MS trace element data. First constraints on the eruption age(s) of the CMV kimberlites from ilmenite Hf isotope compositions suggest multiple emplacement time periods.

Corresponding author: spoitras@ualberta.ca