# Appendix EA 3-1: Analytical Methods

*Lithogeochemistry of intrusive suites*

Thirty-six samples of least- to highly altered intrusive rock were sent to Activation Laboratories in Ancaster, Ontario for crushing, pulverising, and whole-rock geochemical analysis. The analytical package used was 4Lithoresearch (Fusion XRF and ICP-OES). Lab certificates and QA-QC of the output data indicate no analytical issues for the results presented herein. Estimates of the errors for the major and minor elements are 0.5 to 10 % whereas for the trace elements it is 0.24 to 10 %.

*Re-Os geochronology*

Three drill core samples (Fig. A1) were prepared for mineral separation and dated using Re-Os geochronology techniques at the University of Alberta Radiogenic Isotope Facility, in Edmonton, Alberta, Canada. A molybdenite mineral separate was created for each sample through metal-free crushing followed by gravity and magnetic concentration methods described in Selby and Creaser (2004). The 187Re and 187Os concentrations in molybdenite were determined by isotope dilution mass spectrometry using Carius-tube, solvent extraction, anion chromatography and negative thermal ionization mass spectrometry techniques.

For this work, a mixed double spike containing known amounts of isotopically enriched 185Re, 190Os, and 188Os analysis was used (Markey et al., 2007). Isotopic analysis used a ThermoScientific Triton mass spectrometer by Faraday collector. Total procedural blanks for Re and Os are less than <3 picograms and 2 picograms, respectively, which are insignificant in comparison to the Re and Os concentrations in molybdenite. The Reference Material 8599 Henderson molybdenite (Markey et al., 2007) is routinely analyzed as a standard, and during the past 2 years returned an average Re-Os date of 27.77 ± 0.07 Ma (n=10), indistinguishable from the Reference Age Value of 27.66 ± 0.1 Ma (Wise and Watters, 2011). The 187Re decay constant used is 1.666e-11.a-1 (Smoliar et al, 1996).



Figure A1: Images of the molybdenite vein samples collected from drill-core used for Re-Os geochronology. A. Sample CYWS17-01 (CD-09; 170 m). B. Sample KZWS17-128 (KL-16-309; 407 m). C. Sample KZWS19-20 (KL-16-314; 431 m). Mineral abbreviations in accordance with Whitney and Evans (2010).

*References:*

Markey, R., Stein, H. J., Hannah, J. L., Selby, D., and Creaser, R. A., 2007, Standardizing Re-Os geochronology: A new molybdenite Reference Material (Henderson, USA) and the stoichiometry of Os salts: Chemical Geology, v. 244, p. 74-87.

Selby, D. and Creaser, R. A., 2004, Macroscale NTIMS and microscale LA-MC-ICP-MS Re-Os isotopic analysis of molybdenite: Testing spatial restrictions for reliable Re-Os age determinations, and implications for the decoupling of Re and Os within molybdenite: Geochimica et Cosmochimica Acta, v. 68, p. 3897-3908.

Smoliar et al., 1996, Re-Os ages of group IIA, IIIA, IVA, IVB iron meteorites: Science, v. 271, p. 1099-1102.

Whitney, D.L. and Evans, B.W., 2010. Abbreviations for names of rock-forming minerals. American Mineralogist, v. 95, pp. 185-187.

Wise, S. A., and Watters, R. L., 2011, Reference Material 8599 Henderson Molybdenite: National Institute of Standards and Technology Report of Investigation, 30 March 2011.