Differentiating the South Mine Complex and the Main/'04 Breaks at the Macassa Mine, Kirkland Lake, Ontario

L. Stammers[1], S. Horvath[1], N. Banerjee[1], S. Carmichael[2], R. Glover[2], C. Evans[2], S. Farrell[2], J. Johnson[2], D. Rhys[3]

[1]Department of Earth Sciences, University of Western Ontario, London, ON, Canada; [2]Kirkland Lake Gold Inc., Kirkland Lake, ON, Canada; [3]Panterra Geoservices Inc., Surrey, BC, Canada

Abstract

The Macassa Mine is the only remaining producer of several interconnected gold mines that form the KL Gold deposit. This greenstone hosted lode gold deposit is located in the southern Abitibi Greenstone Belt of the Archean Superior province and is hosted within the volcano- sedimentary Timiskaming Group. Greywacke, conglomerates, trachyte flows and sills, and alkali pyroclastic rocks are intruded by alkalic sills and dykes in the mine's two systems of early mineralization. The first system relates to the Main and '04 Breaks. These breaks, or narrow mineralized shear zones, are the main components of a steeply southeast dipping, northeast striking, semi-brittle reverse-fault system associated with the Cadillac-Larder Lake Break. Mineralization occurs within and adjacent to narrow quartz veins associated with early displacement. Gold is associated with pyrite, molybdenite, graphite and tellurides within these veins and altered wall rock. The second system is the southeast shallow to moderate dipping South Mine Complex (SMC) which was discovered in 2003 by current owners, Kirkland Lake Gold Inc., from an extensive exploration program targeting potential mineralization south of the'04 Break. The high grade SMC is comprised of multiple vein-faults, typically mineralized by gold, tellurides, and finely disseminated pyrite within quartz-moly flooding, alteration halos, and well-healed breaks. Mineralization and alteration assemblages in different zones of the SMC and the '04 Break were analyzed in hand sample, in thin section, and with x-ray diffraction (XRD). These results, combined with previous oxygen isotope done by Horvath and structural work by Rhys, suggest they are different systems and that the fluid sources responsible for gold mineralization are most likely different in the SMC than for the `04/Main Breaks. Future geochemical work is planned to better distinguish the two systems and to help identify new gold exploration targets in the district.