

Whole Rock $\delta^{18}\text{O}$ and $\delta^2\text{H}$ Isotopic Footprint of the Canadian Malartic Deposit

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Abstract

The Canadian Malartic deposit is a world class, low grade and bulk tonnage Archean Au deposit. Located in the Abitibi region of Québec adjacent to the town of Malartic, it occurs at the boundary between the Abitibi and the Pontiac sub-provinces of the Superior Province. The deposit is hosted primarily in hydrothermally altered Pontiac Group clastic metasedimentary rocks south of the Cadillac-Larder Lake fault zone. Generally, Au mineralization is associated with quartz-carbonate-biotite stockworks as well as disseminations in the surrounding altered sedimentary rocks. In an effort to fully categorize the largest recognizable footprint attributable to this deposit, a study of the hydrogen and oxygen isotope geochemistry will be conducted to trace fluid-rock interactions. $\delta^{18}\text{O}$ and $\delta^2\text{H}$ data is being collected from a gridded array of whole rock samples both proximal and distal to the mine site. Care is being taken to only analyze rock samples from drill core which are free from quartz-carbonate veins, since these veins will produce isotopic compositions different than the altered rocks. Also, attempts are being made to develop a method of identifying and subtracting the contaminating effect of quartz-carbonate veins from pre-existing sample pulps for utilization in mineral exploration programmes to detect the alteration footprint of similar deposits. $\delta^{18}\text{O}$ and $\delta^2\text{H}$ data will be used to create a whole-rock isopleth map around the Canadian Malartic mine which will provide insight into the fluid flow dynamics of the mineralizing system. Field work scheduled for the summer of 2014 will include sampling and mapping of drill core and of strategically located outcrops that will provide a sample dataset that will enable reconstruction of the fluid flow paths to the edge of the Canadian Malartic hydrothermal footprint.

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