
**Comparing auriferous and barren fluid vein systems at
the 007 Zone Gold Deposit, Bissett, Manitoba**

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The Rice Lake Greenstone Belt (RLGB) has been producing gold for almost a century and is the most prominent gold district in Manitoba (1.77 million oz produced). Despite the long history of mining in the RLGB, the genesis of these gold deposits is not well understood. The 007 Zone gold deposit is a relatively new discovery in the Archean RLGB and barren and auriferous quartz vein systems are used to characterize the 007 Zone deposit using petrography, stable isotopes and fluid inclusions. Alteration (e.g., sericite and ankerite) associated with barren and auriferous veins are similar, however, the oxygen and sulfur isotopic composition of vein quartz and pyrite are distinct. Quartz from barren veins has an average $\delta^{18}\text{O}$ value of 7.7 ± 1.8 ‰, whereas quartz from auriferous veins has an average value of 12.9 ± 2.8 ‰. Pyrite from auriferous veins has slightly higher $\delta^{34}\text{S}$ values (1.8 ± 1.0 ‰) relative to pyrite from barren veins (-1.6 ± 2.2 ‰). These sulphur isotopic compositions of pyrite are consistent with a magmatic source for the sulphur. Fluid inclusion petrography identified three main types of inclusions: (1) primary 2- phase aqueous (H_2O - NaCl) inclusions; (2) primary 3 - phase aqueous -

carbonic ($\text{H}_2\text{O}-\text{CO}_2-\text{NaCl}$) inclusions; and (3) secondary 2-phase aqueous ($\text{H}_2\text{O}-\text{NaCl}$) inclusions. Primary, saline (17 wt % equivalent NaCl) $\text{H}_2\text{O}-\text{CO}_2-\text{NaCl}$ inclusions are most abundant in quartz associated with gold and suggest that CO_2 -immiscibility may have been the dominant mechanism for gold precipitation. Homogenization and stable isotope equilibrium temperatures suggest that barren veins formed at $370 \pm 50^\circ\text{C}$ and 3.5–4.5 kbars, whereas mineralized veins formed at $280 \pm 50^\circ\text{C}$ and 1.5–2.5 kbars. Therefore, the 007 Zone gold deposit shares many characteristics with both mesothermal and epithermal gold deposits, and is interpreted to be a shallow, low-temperature mesothermal gold deposit.