

Nature and timing of mesothermal gold mineralization in western Newfoundland

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Epigenetic gold deposits and prospects in western Newfoundland occur in a variety of settings. The Stog'er Tight and Hammer Down prospects of the Baie Verte area are examples of structurally controlled mesothermal gold occur-

rences associated with major structural zones in accreted terranes of the Dunnage Zone.

The Stog'er Tight prospect is located near the Scrape Thrust, a secondary structure off the Baie Verte Line. It is

hosted by Early Ordovician gabbro in the cover sequence of the Point Rouse Ophiolite Complex. Broad, distinct zones of hydrothermal alteration characterized by chlorite, calcite, ankerite, sericite, magnetite, albite, and pyrite accompany the mineralization. Gold was precipitated by fluid reaction with Fe-rich phases of the gabbro. Alteration involved progressive enrichment in CO₂, S, and K, as well as LILE, REE, HFSE, and Th. Hydrothermal zircon from the prospect has a Silurian U-Pb age.

The Hammer Down prospect, near the Green Bay Fault on the Springdale Peninsula, is hosted by early Silurian felsic porphyry dykes that intrude early Ordovician basalt, andesite, and tuff of the Catcher's Pond Group. Based on age and chemical composition, the felsic dykes are correlated with the Burlington Granodiorite of the eastern Baie Verte Peninsula. Most gold mineralization at Hammer Down is confined to a series of quartz veins that are locally rich in

pyrite, sphalerite, and chalcopyrite, with narrow or absent wallrock alteration zones.

Values of $\delta^{18}\text{O}$ for quartz from both prospects range from +11 to +13‰, and are comparable to those from other mesothermal gold districts. Oxygen isotope thermometry indicates temperatures of mineralization between 250 and 400°C. Hydrogen and oxygen isotopic compositions of the ore-forming solutions imply a mixed fluid provenance.

Geochemical and geochronologic results indicate that the fluids responsible for mineralization in the Stog'er Tight and Hammer Down prospects are analogous to those of typical Archean (and Phanerozoic) mesothermal gold deposits in accretionary tectonic settings. The hydrothermal processes were related to magmatism and metamorphism during Silurian orogenesis and advection along crustal-scale structures.