

Re-Os Arsenopyrite Geochronology of Quartz Veining and Au Mineralization, Meguma Terrane, Nova Scotia, Canada¹

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The absolute timing of quartz veining and related Au mineralization in the turbidite dominated Meguma Terrane, Canada, is presently constrained by mica Ar-Ar age data. These dates from bedding-parallel, bedding-discordant, or saddle-reef quartz veins suggests that all vein types (and associated Au) were formed late in the deformational history of the Meguma Terrane at ~ 370-380 Ma, and that all deposits are of similar age regardless of location. To further constrain the origin of these *auriferous quartz veins*, we have determined Re-Os ages for arsenopyrite (asp), an abundant vein mineral having a cogenetic relationship with gold. Meguma asp contains only ~ 1-10 ppb Re but shows very low common Os and the Os is thus highly radiogenic and amenable for Re-Os dating. Re-Os ages were calculated by either an isochron approach using multiple samples from one vein, or as single-mineral model ages if the abundance of common Os was zero. Arsenopyrite from a bedding-parallel quartz vein forming the leg of a saddle vein at The Ovens in the SW Meguma Terrane yields an isochron age of 408 ± 4.5 Ma (2). Bedding-discordant quartz veins here contain asp having zero common Os and a model age of 407 ± 2 Ma. In the NE Meguma Terrane, asp from saddle-reefs at Dufferin yields an isochron age of 381 ± 3.3 Ma. One asp sample here also has zero common Os and gives a model age of 381 ± 2 Ma (2). The Re-Os asp dates show that at The Ovens, bedding-parallel and bedding-discordant veins are coeval. However, the ~ 408 Ma Re-Os age is significantly older than Ar-Ar mica from this locality (376 Ma). Thus, the mica either formed at a younger time relative to the veins, or potentially it is coeval with veining and has been thermally reset. At present there are no Ar-Ar ages for vein mica from Dufferin. At both Dufferin and The Ovens, structural analysis indicates veining occurred late in the deformational history, but the Re-Os asp dates indicate either a diachroneity of deformation across the Meguma Terrane, or the occurrence of a separate, younger mineralizing event (i.e., fold reactivation event) for saddle-reef ore at Dufferin. In addition, The Ovens asp data provide a minimum estimate of timing for Acadian deformation of 406 Ma. These results confirm that the Re-Os asp geochronometer is a useful tool for evaluating the timing of asp-bearing Au deposits.

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