The geological setting of the Hemerdon W-Sn deposit

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The Hemerdon W-Sn deposit, being worked at Drakelands Mine near Plymouth by Wolf Minerals is centred upon a subvertical, NNE-SSW striking, 100+ m wide Early Permian granite dyke hosted by Devonian metasedimentary and metavolcanic rocks. Mineralisation is overwhelmingly associated with moderately to steeply NW-dipping greisen-bordered quartz-wolframite ± cassiterite sheeted veins. The resource size and dyke host are, to date, unique in SW England. We have undertaken a preliminary evaluation of mine and near mine-site geology in order to place the deposit into a regional geological framework and understand some of the factors that have contributed to the development of such a unique resource.

There has been no systematic BGS re-mapping of the Ivybridge sheet since the 1890s, but the adjacent Plymouth sheet has been recently mapped to modern standards [1] and provides an insight into the Upper Palaeozoic regional tectonic evolution [2]. Mapping of new exposures created during site enabling works in summer 2015 has been supplemented with near mine-site mapping in 2015-16, using Tellus South West radiometric, LiDAR and magnetic data as well as historical AMAX and BGS data. These data shave allowed the Plymouth sheet lithostratigraphy to be correlated further east.

The key issues that contribute to W prospectivity in the Hemerdon area are: (1) The Hemerdon Granite is an old muscovite granite sourced by early (low-T) muscovite-dominated partial melting [3]; (2) Proximity to major NW-SE fault zones that controlled migration of early melts from lower / middle / upper crust; dilation along an earlier NNE-SSW segment allows emplacement of the Hemerdon Dyke and forms persistent ‘chimney’ (magmatic-hydrothermal fluid pathway) during continued crystallisation of deeper magma batches; faults repeatedly reactivated as transfers; (3) Proximity to the Landulph High influences the development of extensional fault zones and tensile fractures in the Hemerdon Dyke and surrounding host rocks during Early Permian post-Variscan extension; repeated movements create effective permeability networks (fault-fracture meshes) during the continued release of magmatic-hydrothermal fluids.

References

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