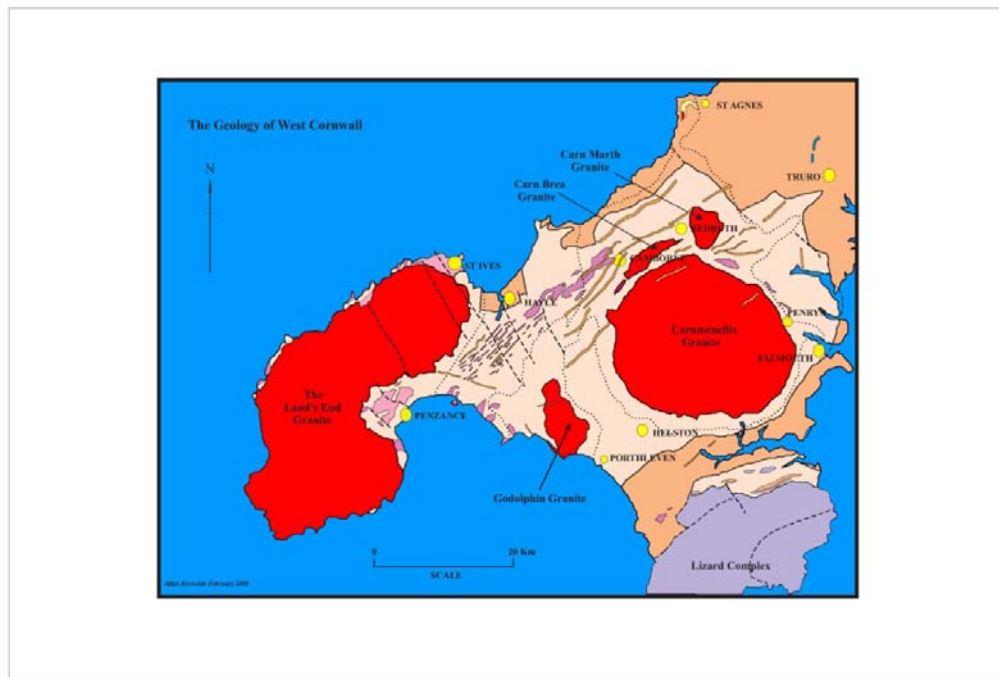


Geology

Essentially the surface of the South Crofty - Dolcoath - Roskear area is situated on “killas”, a series of metasediments, hornfels and skarns, close to the granite contact (which crops out at surface a little to the north of the railway and is aligned ENE). In depth, the granite underlies the entire area but is encountered at increasingly greater depths northwards. The granite surface slopes NNW at angles of 40 to 50 degrees but has rolls and ridges, rather than being planar. It is thought that these local undulations may have some controlling influence or association with the localisation of mineralization. The Granite is that of the Carn Brea stock, which forms the prominent hills of Carn Brea, Carn Arthen and Carn Entral south of the mine site. A series of “greenstone”, typically metadolerite, dykes and metabasite sills crop out to the north. Evidence of skarns, pegmatites, quartz floors and greisenized areas have been disclosed but, to date, none have attained economic significance.



There were many small mines formerly extant in the area, though again with time they became consolidated into the former Dolcoath Mine (to the west of the Great Crosscourse). Whilst there were a number of ancient shallow mines and prospects to the north of Dolcoath Mine, they seem to have been ignored, having been overshadowed by the importance of Dolcoath itself.

Structure

The principal mineralisation is in the form of “lodes” (fissure veins and associated mineralisation) which occupy a series of fracture zones (complex normal and reverse faults) related to stresses developed due to intrusion within the killas and cooling within the granite. These fractures acted as pathways for mineralising fluids of magmatic departure depositing the early hypothermal tin-tungsten mineralisation, and for later phases of mesothermal and epithermal mineralisation related to convecting meteoric and connate fluids.

The section through New Cook's Kitchen Shaft shows the complexity of the lode fissure relationships with north and south dipping structures joined by bridging veins giving an overall dendritic appearance to the deposit. Many of the lodes display curved surfaces in section and may, in the case of south dipping veins in the granite, upon entering the overlying killas reverse their dip to become subvertical or north dipping. There is a general reduction in the number of structures with depth. In effect, the deep major fractures, upon entering shallower horizons of lower regional stress tend to branch and "horsetail", with conjugate or ladder veins forming in the intervening ground.

Several of the lodes that exist within the contact zone in this area fault the granite/killas contact, underlining their primary mode of formation as dislocating structures.

These fracture zones now host complex multiphase lode structures, the strongest of which persist for up to 1-2km or so along strike and for dip heights of up to 600-1000m. Historically, as well as producing from these major structures, a very significant proportion of production has been derived from the less extensive veins and lodes.

Lode Mineralisation

Within the recent workings five main phases of mineralisation have been identified: -

1) An early black tourmaline (schorl) phase, with thin (tin bearing) stringers of schorl emplaced throughout the fracture zones. The tungsten bearing (greisen type mineralisation) quartz floors and pegmatites of Pegmatite Lode and the North Pool Zone are of similar age.

2a) A blue tourmaline phase. This phase carries the majority of the economic tin mineralisation in the form of fine-grained cassiterite, which may be in discrete seams, veinlets or disseminated grains. This phase shows evidence of very rapid crystallisation and often displays brecciation textures related to explosive decompression.

2b) A chlorite phase. In this phase (which often overprints the 2a phase), dark green crystalline chlorite is the dominant gangue mineral. It often carries coarsely crystalline cassiterite, as disseminations and seams, which may form classic crystals of 'sparable' type.

3) A tin-barren fluorite phase. This phase occupies sections of the lodes with 'caunter orientation', where the lodes have been faulted by later tensional wrench faults. These intralode segments (having the same strike as E-W trending caunter lodes) have been infilled with a fluorite/haematite/earthy chlorite/quartz paragenesis, in substitution for absent earlier tin rich phases of mineralisation.

4) A caunter lode phase. These lodes represent later mesothermal / epithermal mineralisation emplaced in E-W trending fractures. These lodes are typically poor in cassiterite, carrying a gangue of early amorphous chlorite / haematite / fluorite / quartz, with copper / lead / zinc / bismuth base metal mineralisation. Where they cross the earlier lodes they fault them, often with considerable displacement.

5) A crosscourse phase. Crosscourses are infilled wrench faults. Most have final phases of displacement and mineralization which post-date phases 1-4, though faults of this type can be found across all phases. Many have a rough N-S orientation related to Permo-Trias wrench faulting. The faults carry an epithermal paragenesis of chalcedonic silica with earthy chlorite, haematite and minor amounts of marcasite and occasional copper and bismuth sulphides. Displacements along crosscourses vary from a few centimetres (though typically of the order of a metre) to over 100

metres in the case of the Great Crosscourse. Many lodes also show intralode shearing related to this phase and carry the same paragenetic sequence as infilling/replacements within the lode.

Glossary of Terms and Minerals

Amorphous – shows no definite stratification or crystalline structure.

Bismuth – a brittle metal with a white – silver-pink colour

Black Tourmaline – hard, silicate mineral with a dark brown – black colour. Also known as Schorl.

Blue Tourmaline – tourmaline with a bluish hue.

Brecciation Texture – made up of angular rock fragments enclosed in a fine-grained matrix or held together by a mineral cement.

Cassiterite – a tin oxide mineral, reddish brown – black in colour and the major ore of tin. Historically known as black tin.

Caunter Lodes – lodes running with a different trend to the main mineralisation.

Caunter Orientation – the angle the caunter lodes follow. The caunter lodes in the area follow a roughly East-West trend.

Chalcedonic Silica – silica that is so fine grained that individual crystals are not recognisable.

Chlorite – term for a group of green coloured mica minerals. Common in metamorphic rocks and as an alteration product.

Connate Fluids – fluids trapped in sediment at the time it is deposited.

Copper – a reddish or orange red metal. One of the main metals historically mined in the Southwest Ore Field.

Crosscourse – a wrench or strike-slip fault which is infilled with clay and rubbly material.

Dendritic – showing tree-like form.

Disseminations – where minerals are deposited in small pores and fissures in a rock from hydrothermal fluids.

Dyke – a tabular intrusive igneous rock that cuts across the country rock.

Epithermal – fluids with a temperature in the range of 50 to 200°C.

Fissure – a large break or fracture in the rock.

Fluorite – a common gangue mineral made up of calcium and fluorine, found in many different colours and display a slight fluorescence.

Gangue Mineral – the valueless rock or mineral associated with the ore.

Granite Contact – where the granite meets the surrounding rock.

Great Crosscourse – a large fault zone running beneath the Tuckingmill Valley and a major feature of the area. The Great Crosscourse acts as a physical barrier between the mines either side of it.

Greenstone – a general term to describe a basic igneous rock

Greisen – a rock made up of predominantly quartz and muscovite formed by the alteration of granite by high temperature gases.

Haematite – a mineral oxide of iron

Hornfels – a fine-grained metamorphic rock formed by contact metamorphism of the local sedimentary rocks by the heat of the granite intrusion.

Hypothermal – fluids with a temperature range of 300 to 500°C. **Intralode Segments** – segment found within a lode

Killas – a generalised Cornish mining term for the metamorphosed sedimentary rocks found in the area.

Lead – a soft, malleable metal.

Marcasite – an iron sulphide mineral, similar to pyrite but lighter and more brittle.

Mesothermal – fluids with a temperature range of 200 to 300°C.

Metabasite – a general term for metamorphosed mafic (magnesium and iron rich) rocks

Metadolerite – a metamorphosed dolerite (a mafic intrusive igneous rock with the same composition as basalt).

Metasediments – metamorphosed sedimentary rocks often retaining some of their original structures.

Metasomatism – where existing minerals are transformed into partially or totally different minerals by chemical replacement during metamorphism.

Meteoric Fluids – fluids from the atmosphere.

Paragenesis – the sequence in which minerals are formed in an ore deposit.

Paragenetic – as above.

Pegmatite – a very coarse grained igneous rock.

Permo – Trias Wrench Faulting – wrench faults that occurred at the boundary of the Permian and Triassic periods 250 million years ago.

Planar – a flat shaped body.

Quartz – crystalline silica. One of the most common rock forming minerals and an essential component of granite.

Schorl – another name for black tourmaline (see above).

Skarns – a contact metamorphic rock composed of calcium, magnesium and iron silicates. The skarns in the South Crofty area originate from metasomatised greenstones.

Sparable Crystals – crystals showing a wedge-shaped nail like appearance.

Subvertical – near vertical.

Sulphide – a compound in which sulphur is combined with one or more metals.

Veinlets – small bodies of one or more minerals deposited in openings of fissures, joints or faults.

Wrench Faults – also known as strike-slip faults, have a near vertical plane where the rock on either side slides past each other.

Zinc – a bluish-white metal

