

**“The Geology and Mineralization of  
the Area between Newlyn and Mousehole Cornwall”**

A Thesis submitted for the degree of

Doctor of Philosophy

in the Faculty of Science of the University of London

by

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October 1964.

**Abstract**

An account is given of the geology of the Newlyn-Mousehole area on the South-East flank of the Land's End Granite. The mineralization is described in greater detail. The country rocks consist of a succession of meta-sedimentary and meta-igneous hornfelses. Four sets of steeply dipping quartz veins parallel to the four major sets of joints traverse the country rocks. In the order of decreasing age the veins trend (1) N-S, (2) E-W, (3) NE-SW, (4) NW-SE.

N-S veins contain loellingite, pyrrhotite, native arsenic and arsenopyrite with minor niccolite. Pyrrhotite and native arsenic exsolve from loellingite and it is the first recorded occurrence of this exsolution assemblage. The interpretation of the assemblage on the basis of the phase relations in the Fe-As-S system indicates that it formed at a temperature of about 600°C with extremely low partial vapour pressures of As and S.

After the sealing up of the N-S veins, mineralization commenced in the E-W veins. S/As vapour pressures increased and arsenopyrite and chalcopyrite with exsolved sphalerite deposited. The NE-SW veins formed after the E-W veins and contain a large variety of minerals. They are the normal 'hypothermal' tin, copper lodes of Cornwall. Mineralization commenced with the deposition of cassiterite followed by arsenopyrite, chalcopyrite, sphalerite and stannite. NE-SW veins are an example of 'telescoped' ore deposits, as high temperature tin-copper assemblages occur in the same vein as low temperature marcasite. Moreover, Cu, Zn, Pb and Bi minerals occur in some veins at the same level as tin and copper in others.

Cross courses trending NW-SE displace all other veins. Extensive brecciation and kaolinization of the country rock indicates that the cross courses are a relatively shallow phenomenon. Some supergene goethite and siderite occurs in the cross courses but they mainly consist of barren quartz.

Fluid inclusion data from quartz-cassiterite assemblage shows that cassiterite deposited from highly saline solutions containing more than 35% of NaCl, KCl and  $\text{CaSO}_4$  at a temperature of more than  $438^\circ\text{C}$  while the cross courses deposited below  $300^\circ\text{C}$ .

Trace element studies of the sulphide minerals from different vein sets also indicate a progressively lower temperature of formation of younger veins. Cobalt and nickel content of arsenopyrite show no relationship with temperature.

Comparison of the mineralization of the present area and that of the Geevor tin mine on the northwestern flank of the Land's End Granite indicates that mineralization commenced at a higher temperature in the southeastern part than in the northwestern part of the Land's End aureole. This supports the prevalent view that the Land's End magma flowed from south to north.