# Foel-Ispri Mine

[SH 703 201]

## Description

Despite its rich mineralogy, Foel-Ispri Mine (Figure 5.17) and (Figure 5.18) was never a major producer. Gold mining met with little success, producing only 88 oz in the period between 1890 and 1899, and while small quantities of lead and zinc ore concentrates were also produced, the mine was finally abandoned in 1903 (Morrison, 1975; Hall, 1990).

Siltstones and mudstones, locally pyritic, belonging to the Middle Cambrian Maentwrog Formation, are intruded by a number of 'greenstone' sills. Numerous steeply dipping quartz-sulphide veins up to several metres in width transect the succession; the largest vein trends east–west with a change to northeast–south-west at its eastern end, while a cross vein runs down the hillside in a gully-like working. The main vein frequently branches, with intra-vein 'horses' of country rock. The wall-rocks are frequently sericitized, pyritized and arsenopyritized, typical wall-rock alteration features of the gold-belt (Mason *et al.,* 2002).

Massive sulphides occur in large blocks on the waste tips of the mine, and a visual inspection of hand specimens reveals their complexity of intergrowth. The textural complexity of the sulphide mineralization is due at least in part to the deformation suffered by the gold-belt veins during the Acadian folding and cleavage development. However, the chief sulphide species characteristic of the gold-belt may all be studied on the macroscopic scale at this locality.

Arsenopyrite and pyrite are both abundant and are early in the paragenesis, occurring as small euhedra in altered wall-rock and in larger aggregates in quartz, close to vein margins; Stage 1 of Mason *et al.* (2002). The second stage in the paragenesis of the overall gold-belt mineralization, here involving gold and tetrahedrite is only locally developed, as evidenced by the small output figure, while Stage 3 resulted in the crystallization of abundant, massive and closely intergrown pyrrhotite and chalcopyrite, the latter containing cubanite and mackinawite inclusions. A further phase of mineralization, Stage 4 of Mason *et al.* (2002) led to crystallization of abundant sphalerite associated with galena, both containing inclusions derived from earlier stages. All stages of mineralization were accompanied by quartz, carbonates, chlorite and white mica.

As noted above, coarse-grained, 'bonanza-shoot' gold was once present at Foel-Ispri, although production figures (Hall, 1990) indicate that it was of extremely localized occurrence. However, some specimens from this mine were preserved during working, and are held in the collections of the National Museum of Wales.

Secondary mineralization, as at most gold-belt sites, is widespread but developed only on a superficial scale. Scorodite is the commonest species present, forming yellowish encrustations on altered arsenopyrite. Iron oxides cement pyritic waste material in places.

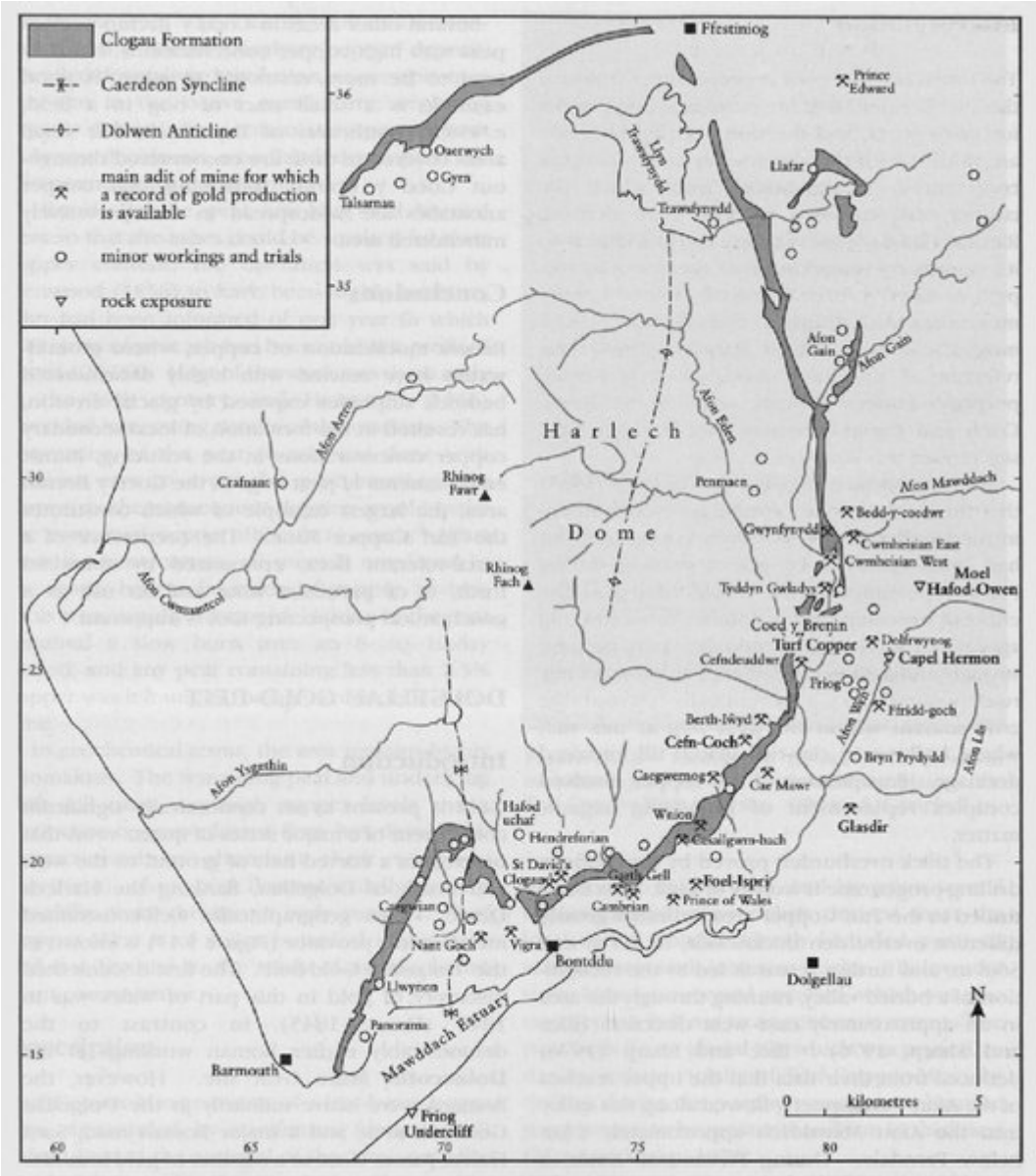
## Interpretation

The paragenetic sequence pyrite + arsenopyrite, followed by 'bonanza-shoot' mineralization, then by chalcopyrite + pyrrhotite, followed by sphalerite + galena is repeated throughout the Dolgellau Gold-belt, reflecting a phased metallogenic process operating on a regional scale. However, the proportions of the various minerals vary from site to site, suggesting that the degree of vein re-opening during each phase of mineralization varied considerably from one vein to another. Foel-Ispri Mine is one of a small number of sites where all stages of activity are represented.

Two principal gold parageneses, described by Mason *et al.* (2002), are represented at Foel- Ispri. These comprise: microscopic gold associated with early pyrite and arsenopyrite; the second being coarse-grained 'bonanza' gold occurring in limited pockets where it lines microfractures in quartz and may replace preexisting sulphide minerals.

The age of the veins at Foel-Ispri, and elsewhere in the Dolgellau Gold-belt, is constrained by the Upper Cambrian strata that they cut, and by their Acadian deformation, as revealed at the Friog Undercliff GCR site. The mineral assemblages that they contain are in many ways similar to those of the Snowdon Caldera veins (see Llanberis Mine and Lliwedd Mine GCR site reports, this chapter), which were formed during the waning stages of caldera development in Caradoc times. Within the immediate area of the Dolgellau Gold-belt, major Tremadoc volcanism was genetically associated with porphyry and breccia-pipe metalliferous mineralization (Rice and Sharp, 1976; Allen and Easterbrook, 1978; Allen and Jackson, 1985; Miller, 1993) (see the Coed y Brenin Porphyry Copper System GCR site reports, this chapter). By indirect analogy with the Snowdon Caldera deposits, it is not unreasonable to assign the genesis of the veins of the Dolgellau Gold-belt to uplift and unloading of the Harlech Dome during the waning stages of the Tremadoc Rhobell volcanic episode, the mineralizing fluids being derived by burial-related dewatering of Cambrian and older sediments.

## References




*(Figure 5.17) Map of the Harlech Dome region, showing the locations of the principal gold mines and the Dolgellau Gold-belt GCR sites. After Institute of Geological Sciences 1:50 000 Sheet 135, Harlech (1982).*

*(Figure 5.18) Photograph of the Foel Ispri Mine GCR site. (Photo: R. Mathews.)*