
Eagle Crag, Cumbria

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Introduction

The workings of Eagle Crag lead mine extend over a vertical interval of about 300 m on the steep E-facing cliffs of Eagle Crag, at the head of Grisedale. The vein, which strikes almost due east-west through rocks of the Ordovician Borrowdale Volcanic Group, forms a prominent narrow gully easily traceable across the face of the crags.

According to Shaw (1970) the earliest workings here are probably very ancient. However, the workings seen today almost certainly all date from the 19th century, with the last mining taking place in 1877. No contemporary plans or section are known, although investigations of the workings by mine explorers indicate that the workings are extensive. Descriptions of the workings and the history of the mine are given by Postlethwaite (1913), and Shaw (1970). Adams (1988) made brief reference to workings on the Eagle Crag and nearby veins.

In addition to the comments on the geology and mineralization in the references already noted, Eastwood (1921) provided a short summary of the mine's geology.

Description

Eagle Crag Vein occupies an E–W-trending fault of very small displacement which cuts lapilli tuffs of the Helvellyn Tuff Member of the Ordovician Borrowdale Volcanic Group. The vein hases southwards at a small angle. Shaw (1970) recorded that throughout the workings it was generally narrow, rarely exceeding 0.45 m in width, and composed mainly of broken country rock together with 'open, crumbly quartz'. A little 'cockscorb' barite is locally present (Young, 1987a). The principal ore mineral, and the only one known to have been worked, is galena. Shaw (1970) commented that this typically occurred as a rib on one of the walls, although gives no indication of which wall. Other minerals within the vein include brown sphalerite, some tetrahedrite and small amounts of chalcopyrite. Tetrahedrite is comparatively conspicuous in the Eagle Crag Vein, and also in some of the nearby associated veins. Whereas Stanley and Vaughan (1981) showed that this mineral, together with bournonite and native antimony, is common in most of the lead-zinc veins of the Lake District, they are usually present as minute, microscopic inclusions within galena. At Eagle Crag tetrahedrite is common as massive or crystalline masses up to 5 mm across. Locally vugs within quartz veinstone contain beautifully developed tetrahedral crystals of this mineral up to 3 mm across. Stanley (1979) noted that the tetrahedrite has a silver content of about 1 wt% Ag. Shaw (1970) recorded that the galena recovered from the mine carried about 16 oz of silver per ton of lead.

The course of the vein across the face of Eagle Crag is conspicuous as an almost continuous line of surface workings in which small sections of quartz-rich veinstone can be seen locally. The vein has also been worked extensively underground from a number of levels driven directly upon it. Some of these have been investigated by mine explorers. Shaw (1970) gives a summary of some of these explorations. Representative samples of veinstone are abundant on the spoil heaps from all of these workings.

Geological mapping reveals that the Eagle Crag Vein is terminated immediately east of Grisedale Beck by a NE–SW-trending fault. Attempts to find an easterly extension of the vein on the lower slopes of St Sunday Crag appear to have been unsuccessful.

Supergene alteration has produced small amounts of hemimorphite, aurichalcite and hydrozincite. Good specimens of the latter mineral, of post-mining origin, were described from parts of the underground workings by Davidson and Thomson (1948).

In Cove Beck, about 250 m north of the main Eagle Crag workings, the spoil from a small trial level driven on an ENE–WSW-trending branch of Eagle Crag Vein shows small quantities of tetrahedrite-bearing veinstone, similar to that from the Eagle Crag workings.

Small workings from a roughly parallel vein about 700 m south of the Eagle Crag workings also contain tetrahedrite-rich vein-stone and have, in addition, yielded small specimens of pyromorphite and wulfenite (Young, 1986).

Interpretation

Veins in which lead and zinc minerals are the major metalliferous constituents form an important suite of deposits within the Lake District. Within these veins, galena and sphalerite are typically the most abundant ores, accompanied locally by minor amounts of chalcopyrite. Typical gangue minerals in this suite of veins include quartz and locally barite. The Eagle Crag Vein is an example of this suite of Lake District lead-zinc veins.

Stanley and Vaughan (1982a) noted that the lead-zinc veins occur above the roof region and both the north and south walls of the mainly concealed Lake District Batholith, although with no well-defined relationship to known features of the batholith. K-Ar dating suggests that they may be of Lower Carboniferous age (330–360 Ma) (Ineson and Mitchell, 1974; Stanley and Vaughan, 1982a). Lowry *et al.* (1991) have suggested that these veins formed at temperatures of between 110°C and 130°C from highly saline brines. Metals may have been derived from rocks of the Skiddaw Group, as well as from basement granites, perhaps in part involving convective leaching by Carboniferous seawater.

Similarities between the lead-zinc veins of the Lake District with those of the Northern Pennines have been made by Vaughan and Ixer (1980), and Stanley and Vaughan (1982a), although the latter authors have also highlighted striking similarities in both mineralogy, and age with the mineralization in the Carboniferous limestones of central Ireland.

Conclusions

Eagle Crag provides perhaps the finest opportunity to study a vein typical of the Lake District suite of lead-zinc veins. Although examples of mineralization in *situ* are limited to a very small number of surface outcrops and sections accessible underground, the site contains abundant spoil representative of this important group of deposits.

[References](#)