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# Seathwaite Copper Mines, Cumbria

[SD 266 977]

## Introduction

This small group of old copper workings is remotely situated in the valley of the Tarn Head Beck, approximately 0.5 km east of the head of Seathwaite Tarn. The workings should not be confused with the old graphite workings in Borrowdale, described in this volume under the Seathwaite Graphite Mine GCR site report.

Mineralization at Seathwaite Tarn, which may be regarded as a western extension of the copper mineralization formerly worked at the Bonser and Paddy End mines of the Coniston area, is distinguished by the presence of copper mainly as 'grey sulphide' ores, accompanied by small amounts of wittichenite and rare gold.

Little is known of the history of working, although Adams (1988) noted that the mine lease was forfeited in 1860. No production records survive, although output is likely to have been modest.

## Description

According to Dewey and Eastwood (1925), the Borrowdale Volcanic Group rocks in the valley of Tarn Head Beck, east of Seathwaite Tarn, are cut by four roughly E–W-trending copper-bearing veins. More-recent mapping by the British Geological Survey (1998) has revealed that these volcanic rocks here comprise andesitic tuffs belonging to the Whorneyside Formation, and rhyolitic welded tuffs of the Oxendale Tuff at the base of the overlying Airy's Bridge Formation. The Seathwaite Tarn veins occupy part of a series of faults which can be traced eastwards to the Levers Water area where they also locally carry copper mineralization. There are no surface exposures of these mineralized veins. However, several levels e.g. at [SD 2662 9976] and [SD 2653 9941] have been driven into them and, although none remains safely accessible, the comparatively small spoil-heaps contain representative samples of veinstone. These reveal that the main vein-filling consists of brecciated wall-rock in which ribs and lenses of massive white quartz carry abundant chlorite and scattered concentrations of copper sulphides. Most abundant are 'grey copper sulphides' with only subordinate quantities of chalcopyrite. Stanley and Criddle (1979) recorded that these grey sulphides include both digenite and djurleite. They also noted the presence in this ore of arsenopyrite, cobaltite, covellite, crystalline hematite and pyrite. Bornite is a conspicuous ore mineral in many samples. In material from the uppermost dump, these authors identified small amounts of the rare copper bismuth sulphide mineral wittichenite ( $\text{Cu}_3\text{BiS}_3$ ), the first recorded British occurrence of this mineral, together with a single grain of gold (Stanley and Criddle, 1979).

A level [SD 2611 9933] driven north through andesite of the Birker Fell Formation appears to have been an unsuccessful trial, although Dewey and Eastwood (1925) reported that a vein up to 0.9 m wide was cut. No mineralization is present on the dump from this level.

## Interpretation

The Seathwaite veins exhibit many similarities with the widespread suite of copper-rich Lake District veins which includes those at the Coniston Copper Mines, Birk Fell Hawse Mine and Dale Head North and South Veins GCR sites, described elsewhere in this volume. Typically these veins carry abundant quartz accompanied by chlorite, arsenopyrite and copper sulphides. Whereas in most instances, the most abundant copper sulphide is chalcopyrite, in a few locations, notably here at Seathwaite Tarn, 'grey copper sulphides', are dominant. In their classification of Lake District mineralization, Stanley and Vaughan (1982a) commented on the origins of this copper mineralization and proposed a Lower Devonian age of emplacement.

However, more recently, Millward *et al.* (1999) demonstrated a pre-Acadian age for copper mineralization at the Coniston Copper Mines GCR site and elsewhere in the Lake District. Whereas these authors did not specifically investigate the

Seathwaite deposits, their mineralogical characteristics and structural setting clearly link them genetically with these other Lake District copper veins.

In the interpretation of the Birk Fell Hawse Mine and Dale Head North and South Veins GCR sites (see GCR site reports, this chapter), it has been suggested that the abundance of bornite in the higher levels of the veins may be evidence of supergene enrichment. Although nothing is known of the composition of the Seathwaite veins in depth, the sulphide mineralogy here may also reflect such enrichment.

## **Conclusions**

The copper veins at Seathwaite mines are an important expression of pre-Acadian Lake District copper mineralization in which 'grey copper sulphides', rather than chalcopyrite, are the dominant ore minerals. The veins have yielded the first British specimens of witichenite, and may also give evidence of supergene enrichment.

## **[References](#)**