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## Lockridge Mine, Devon

[SX 438 664]

### Introduction

The Lockridge Mine GCR site, near Bere Alston, Devon (see (Figure 7.43)), is a dump site located south of Lockridge Farm road. A minor hillock reveals a quite substantial mineral-rich tip, while immediately to the south of this a fenced open shaft probably represents the working from which the material was obtained. The surface of the tip is kept relatively fresh by undercutting caused by the stream running through the valley bottom, and good specimens of the ore assemblage can be collected. Sphalerite is common, in specimens banded with quartz (often chalcedonic), with a little galena, while recently wurtzite has been identified forming intergrowths with sphalerite showing 'ice-fern' texture (Grguric and Nickel, 2006). Light-green massive fluorite can also be found. Some quartz specimens show bands of casts from well-crystallized fluorite.

Quartz, fluorite, sphalerite, wurtzite and some galena mineralization can also be collected from the extensive but compressed dumps which form part of the hill-slope at [SX 438 664]. These overgrown dumps extend along the whole of the wooded area alongside the road to Lockridge Farm. At the western end they surround old mine buildings and the chimney of Lockridge Mine. The start of the dumps can be found just to the west of the railway bridge. Fenced shafts on this site, which are in a dangerous condition, can be traced southwards along the line of the mineralized cross-course.

The silver-lead mines of the Tamar Valley (see (Figure 7.43)), lying on the Bere Alston–Bere Ferrers peninsula, have probably been more profitably worked over a longer period than any other area in England, and were among the earliest of all mining operations in South-west England. The mines are believed to have been worked as early as the 13th century. Due to the high proportion of silver discovered in the lodes, they ranked as 'royal mines' and were financed by the Crown, thus allowing for a development greater than most in the Middle Ages. There appears to have been long periods of idleness, until the 1780s when renewed activity continued into the 1800s. The peak period of activity was in the 1840s and 1850s. By the 1880s most of the trials and mines had closed.

The mines, which have long been abandoned, also produced fluorite. Individual crystals of fluorite were often of a complex habit and highly attractive. Sowerby (1817) figured a group of zoned fluorites with rounded corners from the 'Bere–Alston lead mine in Devonshire' (see Embrey and Symes, 1987). Some of the old dumps are still relatively rich in fluorite (Dines, 1956).

At the present time fluorite found on the dumps occurs as purple to light-green cubes with quartz and chalcedony within and on slates. It is reported that green and colourless fluorite was worked from the dumps of Lockridge Mine in 1942.

There is only a limited literature on the mine. It was discussed and recorded by Dines (1956), and figured in the historical industrial descriptions of the Tamar Valley by Booker (1967), and Hamilton Jenkin (1974), with further mention by Durrance and Laming (1997).

The mine represents an example of cross-course mineralization, which trends almost normal (roughly N–S) to the main-stage veins in South-west England. These veins developed late in the history of mineralization associated with the Cornubian Batholith.

### Description

A strip of country about 1.5 km wide alongside the Tamar and extending about 6.5 km southwards from Calstock consists of Devonian country rock ('killas') (shales at Lockridge) with some outliers of 'Culm Measures' shales at the northern end. The country rocks are traversed by two N–S-trending (E-dipping) cross-course lodes. These have yielded important amounts of lead and silver.

The eastern cross-course, about 1.2 km east of the western lode, is barren beneath Calstock but has been worked almost continuously from Buttspill Mine [SX 437 677] southwards through the Tamar Valley on to Lockridge Mine [SX 438 664], Furzehill Mine [SX 436 654], and the South Tamar Consols [SX 437 645], a proven 3.5 km length of productive ground. The mines were known collectively as 'Bere Old Mines' or as 'Tamar Valley Mines'.

The Lockridge Mine was also known as 'Goldstreet Mine', and is situated 1.6 km southwest of Bere Alston. Dines (1956) gave some details of the mine, noting that an adit was driven 450 fathoms east by north from its portal, 165 m north-east of Whitsam [SX 430 662]. Two dumps may mark the course of the lode, but shaft sites are now obscured. Dines (1956) recorded that the northern dump, 825 m northeast of Whitsam, was estimated to contain 700 tons of slightly pyritous shales, much vein quartz, some fluorite and a little sphalerite. The other dump, 230 m to the south, probably of around 1000 tons, contains more fluorite and was worked over in 1942.

Dines (1956) recorded that the dumps of the South Tamar Consols extended down to the River Tamar just north of Clamoak Quay [SX 438 645]. They were extensive but of little mineralogical interest. The workings of Furzehill Mine extend much farther south than is indicated by Dines (1956), and are almost continuous with those of South Tamar Consols. They occur adjacent to the site of an engine house and shaft above the Bere Alston to Weirquay road. Today there seems to be little of mineralogical interest, although Dines noted that the dump contains some green fluorite.

Lode-filling within the cross-course is quartz, along with sphalerite, fluorite and galena, while some siderite is also present. In many of the Bere Alston mines galena was rich in silver near surface (up to 100 oz per ton of lead), although at depth the content fell somewhat. The silver content, however, was the chief value of the mines. The area was also one of the main producers of fluorspar in South-west England, although the specific output of the Lockridge Mine is not recorded. Production statistics are incomplete for the mine, but the recorded output of the valley mines as a whole is some 25 000 tons of lead ores, yielding 18 900 kg of silver.

## Interpretation

North of the Tamar Valley the two parallel, north–south cross-course veins of Lockridge Mine cut the Gunnislake tin-tungsten-copper lodes. The mineralization and style of formation are typical of the cross-courses of South-west England. The hydrothermal assemblage, comprising galena, sphalerite and sometimes argentite, is indicative of low-temperature (200°C) mesothermal mineralization, in zone 5b of Hosking (1964).

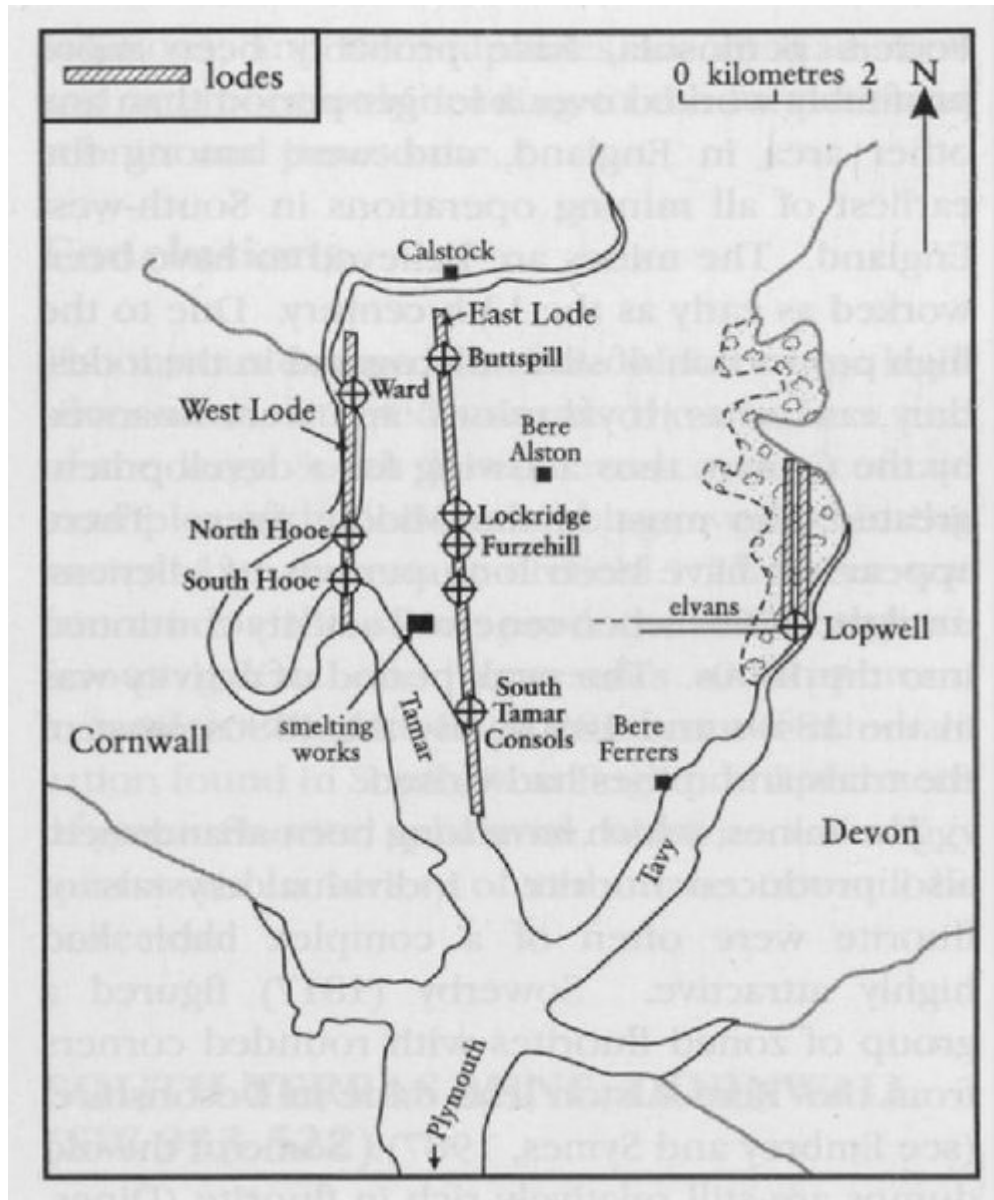
As noted above, the early, near-surface workings were particularly rich in silver but the content diminished with depth. This seems to suggest some enrichment by the action of percolating surface water.

The Lockridge and related mines were essentially lead-silver producers, with the silver being contained in galena. However, in lower-temperature epithermal deposits the temperature of formation of the galena is lower, and also lead is often complexed with antimony. This leads to a situation in which silver can no longer be fully contained in solid solution and silver minerals may form directly from the ore solutions. Some mines in South-west England have been worked for native silver and/or silver-bearing minerals, for instance Wheal Brothers at Gunnislake, and Wheal Herland near Hayle (see Embrey and Symes, 1987). Other mines, notably in North Cornwall, have produced silver associated with antimony and copper minerals. The formation and nature of typical cross-course mineralization has been described at other GCR localities, such as the Wheal Penrose GCR site. In summary, there is a gradual change in the mineralogical composition between zones 5(b) and 6 of Hosking (1964). Near the top of zone 5(b), zinc, in the form of sphalerite, becomes a subsidiary or accessory ore mineral. Silver minerals often separate from the lead ores and complex with available copper and antimony, forming minerals such as pyrargyrite and stephanite (as at Wheal Newton, in Cornwall). In zone 5(b) subsidiary amounts of copper may be present as chalcopyrite or cupriferous pyrite, but in the lower part of zone 6 complex sulphosalts such as bournonite and tetrahedrite are the prominent copper-bearing minerals. Famous localities for the formation of these minerals in Cornwall are Wheal Boys and the Herodsfoot Mine. In the upper part of zone 6, copper is eliminated from the residual ore-bearing solutions, and the sulphides are of lead, iron and antimony only, leading to the formation of stibnite and jamesonite.

## Conclusions

The various dumps from the old Lockridge lead-silver mine, situated towards the northern end of the large South Tamar cross-course, contain examples of the lode assemblage worked in this ancient but important orefield. The area was famous for the silver produced from argenti-ferous galena and represents an important example of the late-stage cross-course mineralization found in South-west England. Specimens of green fluorite, sphalerite, wurtzite and vuggy quartz with a variety of carbonates can still be collected.

## References



(Figure 7.43) Location map of Lockridge Mine and the silver-lead mines of the Tamar Valley. After Booker (1974).