Early lead smelting sites in the Swaledale area of Yorkshire
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ABSTRACT: Many bale smelting sites have been located in the Swaledale area. Their locations were influenced by several factors, principally a position within a few kilometres of lead mines, with ready access to the valley floor and sufficiently elevated to catch the prevailing winds. The site topography was very varied: many bales were at the head of a scar, preferably with an open aspect, but sloping ground was commonly used. The ideal was a ridge or a rounded hill projecting from a fellside, allowing operation under a wide range of wind directions. An additional geological factor was a position with a refractory silicious base rock underfoot. Sandstones were imported where necessary. In some areas there are many more bale sites than elsewhere and possible reasons for this are discussed. Most bale sites had no associated pits or structures and little slag, indicating batch smelting of small quantities of pure galena. Possibly larger quantities were smelted in shallow pits with a forward opening, set on a slope at the head of a brow. A few sites had charcoal dumps and slags which indicate higher temperatures were attained, and the technical implications of this are considered.

Introduction

The Swaledale area is a high plateau region of bedded strata dipping to the east, but intersected by the deep flat-bottomed valleys of the Swale and Arkle becks and their tributary gills. Geologically this area is a region of Carboniferous rocks of the Brigantian and Pendleian periods, consisting of cyclic deposits of sandstone, shale, chert and limestone. The succession of strata with different resistances to weathering has given rise to a step-like series of cliffs or scars along the valley sides. There are many mineralized veins in this area, a high proportion of which contained workable deposits of lead ore. The important deposits were located in the Main Limestone and overlying cherts, termed the 'bearing beds'. In most cases the workings were richest over a comparatively small vertical range of 30-60m (Dunham and Wilson 1985, 9, 10, 51-3, 85). The moor tops at elevations of around 350-500m AOD frequently expose the bearing beds under a light surface cover of peat or clay, and the river valleys provide sections through the strata which would have facilitated the finding of the mineral veins. Figure 1 shows the principal features of Swaledale and part of Wensleydale, and the lead-bearing veins in their geological context.

The mines

There are indications that lead mining was carried out here, albeit intermittently, for the best part of the last two millennia. On the high plateau at Hurst a group of rich veins in the bearing beds was exposed at surface, and the discovery of a lead ingot of Hadrianic date (117-138AD) is evidence for working as far back as the Roman period (Spaight 1897, 207; quoted in Raistrick and Jennings 1965). Virtually nothing is known about the next thousand years, but when the Benedictine priory for nuns was established at Marrick in about 1165, the roofs were made from local lead from the Hurst mines, which were said at that time to have existed 'from time out of mind' (Tyson 1989, 13).

During the 12th century, and in particular from 1130 to 1170, large quantities of lead are thought to have been produced as a by-product of silver mining in the border county workings known as ‘the minery of Carlisle’, and Blanchard (1981, 72) has argued that lead mining in other areas was not viable until the former were stopped by the Scots invasions of 1171-72. This cannot be entirely true however, for there were lead mines at Hurst long before 1165, others at Grinton and Arkengarthdale.