

Streams of tin

Tin streaming

By the thirteenth century the Cornish tin industry was already internationally important. The landscape of the medieval tin industry represents the most extensive remains of pre-1700 mining in Britain. During this period a substantial amount of tin produced in Cornwall came from tin streaming, and the industry provided employment and wealth far beyond that to be expected from such a remote and poor agricultural area as Cornwall. The boom years for tin streamers were the 1330s when more than a million pounds (2,200 tonnes) of tin was produced annually. Although tin streaming declined in importance after the seventeenth century it continued as an industry up to the mid 1900s.



Streamworks on Breney Common, Lanlivery. The water-filled pits visible towards the lower centre of this photo were dredged for tin as recently as the 1960s, but the alluvial tin deposits here were being worked at least 800 years ago. Photo. English Heritage (NMR) RAF Photography. RAF 540/994/F21/0081

Countless valleys were turned over for tin. Tin streaming was carried out on a massive scale, as evidenced by the vast man-made landforms on Bodmin Moor, Goss Moor, Hensbarrow, Breney Common and Redmoor, as well as in the valleys draining the mineral rich areas elsewhere across Cornwall.

The removal of millions of tonnes of overburden resulted in rivers and estuaries, such as the Fal, Fowey and Carnon, becoming heavily silted. Tidal limits were progressively pushed downriver so that former ports became marooned amidst salt marsh.

How Tin Streaming Worked

Deposits of alluvial tin occur where tin-rich rocks have been broken away by erosion from their parent seam or 'lode', and have accumulated in the bottom of river valleys. These accumulations are known as tin streams.

After the formation of a tin stream, layers of sand and gravel settled on top of it. Over time they in turn were covered by accumulations of peat and leaf mould. These layers of overburden are frequently several metres deep. To reach the tin stream the tanners first had to remove the overburden. This was done by hand and dumps of unwanted overburden were produced alongside or downstream of the working areas.

The technique used to extract tin from these streams is known as tin streaming. Streamworkers took advantage of the fact that cassiterite (tin ore) is denser than the associated minerals which constitute granite. By diverting a stream of water over and through the tin stream, the lighter sands and silts could be washed away in suspension leaving behind the heavier gravels containing tin-rich rocks.



Tin streaming in Cornwall was similar to that elsewhere, particularly in the Erzgebirge region of Eastern Europe, where it is well documented by contemporary writers such as Agricola (1556). This etching of Agricola shows the removal of overburden and the washing away of unwanted gravel to separate out the heavier tin ore.

Ramped Workings

Streamers developed a range of methods to separate the cassiterite from the waste, depending on the nature of the tin stream and the elements constituting the overburden; each method produced its own distinctive type of earthwork remains.

Where large amounts of coarse overburden covered the tin stream the heavy wastes were systematically removed by wheelbarrow. This method of dumping waste produced a characteristic pattern of overlapping rectangular mounds. In cross section each mound is shaped like a wedge of cheese, with a shallow gradient leading to a steep scarp.

Streams had to be temporarily diverted from the working areas to allow access to the tin gravels. As the whole width of a tin stream was worked numerous diversion channels were dug, sending the stream first one way, then another. As a result many streamworks have left deep cuttings gouged into the surrounding landscape.



An example of extensive ramped workings at Tresibble, Restormel. A series of overlapping mounds are arranged on either side of the stream. These mounds or ramps were formed by the practice of systematically dumping wheelbarrow loads of waste as the work proceeded. The length of each dump reflects a reasonable distance over which the waste could be barrowed. Once this distance was reached a new dump was started; hence the overlapping 'wedges'. The ground was exploited in strips in this way and the workings have scoured the landscape to a considerable depth. English Heritage (NMR) RAF Photography. RAF 540/994/F21/0088

Parallel Workings

In situations where the overburden was shallow or comprised fine material, most of it could be simply washed away saving much heavy labour.

In this type of streamworks water was brought through a channel into the working area and the overburden was washed into the river or a drain where it flowed downstream in suspension. The heavy stones and gravel left behind were piled up to

form steep linear banks just downstream from the working area. By dumping waste on the area just worked, the streamers maintained a consistent width to their current working area. This would have been essential for maintaining a steady flow of water at the optimum velocity for the operation. Working upstream in a systematic way the streamers produced a regular pattern of parallel banks of spoil.



Streamworks at Ennisworgey, Restormel. There is a well-defined alluvial working to the south of the stream, towards the left centre of the photo. A diverted channel defines the southern limit of the workings. From this channel water would have been fed into the workings to wash away the lighter overburden into the stream. Heavier waste has been dumped in a series of slug-like mounds forming a classic parallel pattern. To the north, eluvial workings snake up the hillside fed by a series of leats. An unusual amount of detail can be seen here, including individual mounds of waste and the clearly-defined squared-off end of one of the workings. Photo RAF 543/2332/F22/0170 ©Crown copyright. MOD

Eluvial Streamworks

Eluvial tin streams are those where tin-rich rocks eroded from the parent lode are deposited in dry valleys or on hill slopes rather than washed into river valleys.

From a tin streamer's point of view the advantages of eluvial tin streams were that there was normally much less overburden to be dug away, there was no need to dig channels to divert the river (in some cases a major undertaking), and there was no problem with drainage in contrast to some low-lying alluvial workings. The great

disadvantage was that water for washing away the waste material had to be brought to the site from available streams, often over long distances. This was done through a system of hand dug channels known as leats. Water brought via the leats was stored in purpose-made reservoirs until needed.

For these reasons it is likely that eluvial streams were worked in winter when high rainfall meant water was plentiful. Conversely alluvial streamworks were probably worked in summer when river levels were lowest, making it easier to control the flow of diverted water and facilitating drainage.



Eluvial streamworks at East Moor, Altarnun. To the left of the workings three leats can be seen. These would have brought water to a purpose-built reservoir for use as required. The well preserved dam visible at the head of the workings would have controlled the supply of water from the reservoir. Photo © Cornwall County Council Historic Environment Service

In the upper part of the streamworks at East Moor, the workings comprise a cutting but few or no spoil banks. It seems overburden was particularly shallow or fine so it could simply all be washed away with no recourse to digging. Workings of this type are not uncommon but eluvial streamworks were most often operated using the parallel workings technique.

The working of eluvial tin streams called for skill in maintaining optimum water velocity given the steep or varying gradients of the hill slopes where they occur. In the lower part of the East Moor workings the waste has been dumped in banks running parallel to the cutting. This method of working was adopted on gentle slopes

where the flow of water was at optimum velocity for washing away the overburden; work would proceed out from the centre into the hillslope.

If this type of working were attempted on a steep slope, the force of water would wash away the cassiterite with the overburden. In those situations the water supply was brought in parallel to the contours to reduce its velocity and the force of water was further controlled by arranging the waste dumps parallel to the contour.