

White Gold

Introduction

China clay (kaolin) is a form of decomposed granite used in the making of porcelain and, more recently, as an ingredient in paper, plastic, cosmetics and pharmaceuticals. The production of china clay remains a major extractive industry in mid-Cornwall.

In the early part of the nineteenth century, clay production was a localised small scale industry. Extracting the clay was very labour-intensive, output was restricted by the slow drying process in use at the time, and there was no developed transport infrastructure in the St Austell area (the main centre of china clay production).

After 1820, during the copper mining boom around St Austell, new harbours were built, some connected by rail to the industrial hinterland, and the industry was transformed around 1850 with the adoption of pan kilns to dry the clay. Between 1840 and 1860, production increased five-fold. By the turn of the twentieth century more than half a million tons of china clay were being produced annually in Cornwall.

The importance of china clay extraction is recent in historic terms, being little more than 200 years old, but it has created its own unique and fascinating industrial landscape.



Today's landscape in the Central China Clay district near Nanpean. Photo © Cornwall County Council Historic Environment Service

Stream & Strake

China clay or kaolin is a fine white clay found in deposits of granite in which feldspar crystals have been altered by geological processes. In Cornwall it is found mainly on the Hensbarrow Moors north of St Austell but also on Bodmin Moor, in West Penwith and on Tregonning Hill near Helston. The potential for the use of china clay in the

manufacture of porcelain was first recognised by William Cookworthy at Tregonning Hill near Breage around 1746 and soon afterwards the first pits were opened.

These first pits were shallow in order to avoid the costs of pumping, and production methods were primitive. After removal of the surface soil or overburden a supply of water was brought to the site; this was done by digging channels known as leats across the moors to divert water from streams. The water was then directed over the exposed clay ground to take off the clay in suspension, leaving behind the unwanted rocks in a gully or 'strake'. This was carried out by men stood in the stream, breaking up the ground with 'dubbers' (specialised pick axes). The clay then flowed downhill to the processing area.

The waste material left behind in the strake had to be removed. In the early days of the industry this was done by hand but the disposal of waste was later mechanised, with power provided by waterwheel, horse whim (capstans powered by horses walking around a circular platform) or steam engine, the wastes being hauled up a railed incline and then trammed out along flat-topped finger dumps. These dumps are a characteristic feature of early china clay workings but few survive today.



Nineteenth century china clay workings at Burnt Heath, Cardinham. Finger dumps of waste lie to the right of the abandoned pit. Circular and rectangular settling tanks also survive. Photo © Cornwall County Council Historic Environment Service

In these early, shallow pits the liquid clay flowed out of the lower end of the pit. Processing took place downhill from the pit where the clay slurry flowed through three stepped tanks to separate the kaolin from the other components of granite. In the first tank sand was deposited, in the second a mixture of fine sand and mica, in the third tank mica alone was deposited.

The clay was then allowed to flow into rectangular or circular stone-lined settling pits. In these the clay settled to the bottom and the top water was drained off through wooden pipes. The clay slurry was then run off through a sluice in the base of the

tank into shallow pans where it slowly dried in the open air. When it was dry enough to be cut into blocks it was stacked in open-sided sheds known as air dries.

Pan kilns

Up until about 1850 all china clay extracted in Cornwall was dried in air dries. Given the damp Cornish weather this was an inevitably slow process and required much heavy labour. In winter, preparation of the finished clay could take as long as eight months and only two 'savings' were produced annually.

During these early years there was only one adequate harbour from which to ship the finished clay to the Staffordshire potteries. This was at Charlestown, built by Charles Rashleigh as a mineral port during the 1790s. New ports were built at Pentewan and Par to serve the rapidly expanding copper industry, and in 1842 a horse tramway was built from Par harbour to Bugle in the heart of the clay country. The improvement of the transport systems had the effect of lowering the price of china clay which in turn increased demand for the product. Cornish producers struggled to meet this demand.

At a stroke the major obstacle to increased production was removed in 1845 with the building of the first pan-kilns for the drying of clay. These were based on the slip kilns of Staffordshire. A furnace at one end of the building was connected to a chimney at the other by a series of brick flues running beneath a floor of porous tiles. The creamy clay was run from settling tanks onto the floor of the kiln. Moisture in the clay was drawn out through the floor tiles and through the chimney in a white plume. During the 1860s and 70s pan kilns developed into a standard form to become a familiar part of the landscape of the clay country.



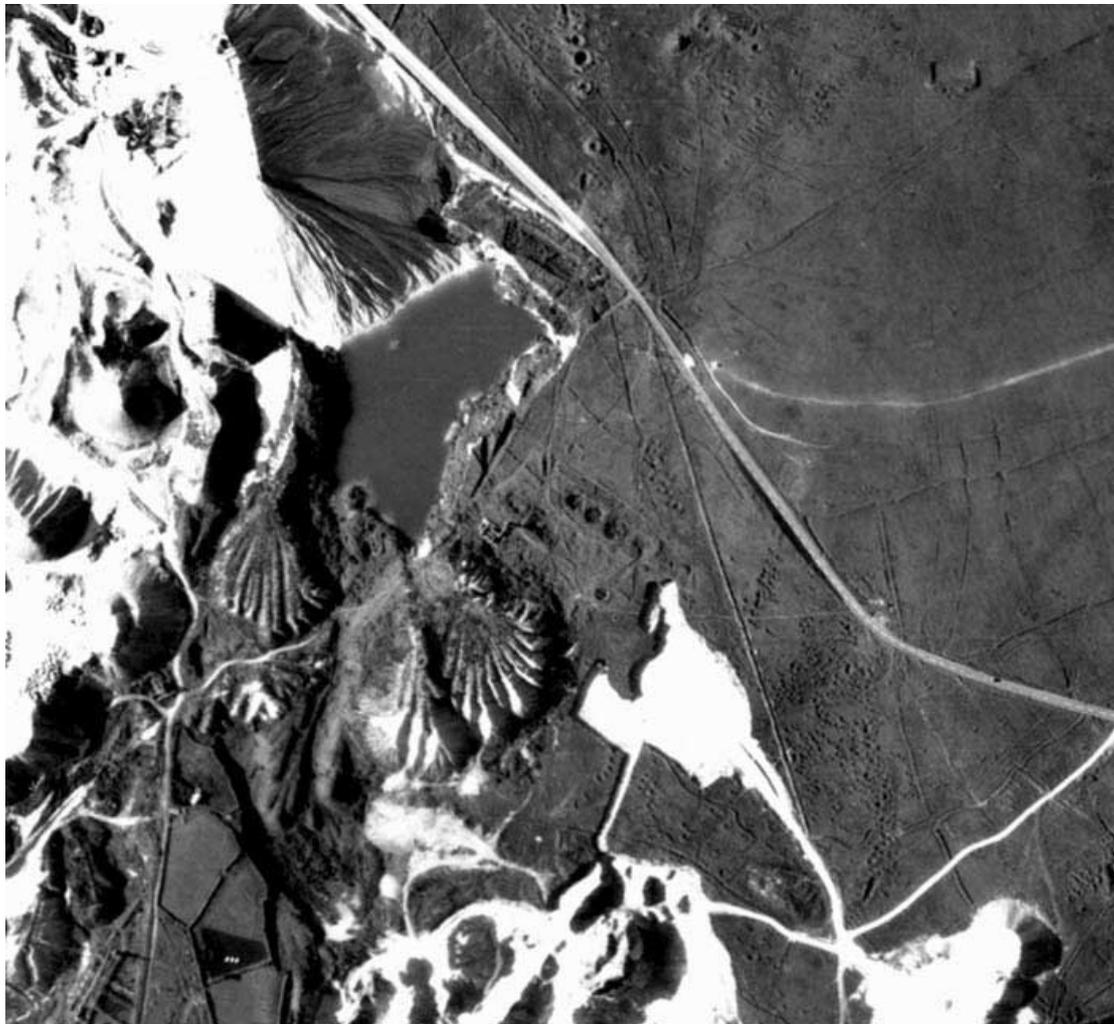
A ruined pan kiln at Leswidden near St Just. Photo © Cornwall County Council Historic Environment Service.

Sky Tips & Mica Drags

The years of increasing china clay production in the second half of the nineteenth century saw a number of changes and improvements in the industry. The old

methods were uneconomical with the land; the extensive finger dumps of waste material, for example, were lying on top of good clay ground. Sky tips were a new form of waste dumping. Waste was hauled out of the pits up steep railed inclines and dumped off the top of the incline which gradually extended upwards as the tip grew. The resulting pyramidal dumps, the 'Cornish Alps', were a distinctive feature of the clay country. After the Aberfan disaster of 1969 most of the sky tips were levelled.

The china clay landscape at this time was characterised by numerous shallow pits controlled by individual companies, each with tightly defined land boundaries within which they could legally extract and process the clay. These constraints meant that many existing pits could not be extended outwards and had to be sunk deeper. This necessitated pumping the liquid clay to the surface rather than letting it flow out of the pit. This was done by sinking a shaft by the edge of the pit, digging a tunnel or 'adit' to a point below the centre of the pit, and then digging another tunnel or 'rise' upwards to the base of the pit. The liquid clay was fed into the rise, flowed along the adit and was then pumped up the shaft from where it ran to the processing area.



The landscape at Hensbarrow Downs in 1949. In the centre left of the photo is a disused and water-filled china clay pit fringed by a series of finger dumps and a processing area with circular settling tanks. In the top left of the photo a sky tip, taking waste from a pit out of the photo, is spilling into the disused pit. Photo RAF 543/2332/F21/0207 ©Crown copyright. MOD

Waterwheels were used initially to pump the clay up the shaft but later Cornish beam engines, widely used in the tin and copper mines, were adopted by the china clay industry and engine houses became a common sight in the clay district.

The introduction of mica drags made the process of separating the clay from the unwanted sand and mica far more efficient. Drags consisted of rectangular stone tanks with a very shallow gradient and divided into a series of long narrow channels separated by boards (in later years by concrete dividers). Instead of letting the clay slurry flow into three stepped tanks, it was now directed into the drag. Because of the gradient the flow of liquid clay was slowed allowing the heavy sand and mica to be progressively deposited in the bottom of the channels.



China clay workings around Hensbarrow Downs, showing large sky tips, pan kilns and mica drags (towards the bottom of the photo). Photo RAF 543/2332/F21/0207 ©Crown copyright. MOD

Modernisation

At the turn of the twentieth century the landscape of the St Austell area had become transformed by numerous pits, conical dumps, settling tanks, engine houses and pan kilns. Further changes allowed the industry to keep pace with the international demand for china clay.

High powered hoses replaced 'stream and strake' to wash the clay from the ground. Electrical pumps were introduced and in time they replaced the beam engines for pumping the clay slurry out of the pits. The high price of coal spelt the end of the pan kiln; these were replaced oil-fired driers. Pits expanded and merged to become deep and extensive excavations, and waste material is now dumped by lorry onto flat-topped 'benches' which are seeded with grass.

These huge twentieth century workings have damaged or completely destroyed most of the earlier pits, dumps and processing areas. Here and there are remains of the earlier industry, but the most extensive remains of the china clay workings are to be found in the areas where the industry was less successful, on Bodmin Moor and in West Penwith.



Treviscoe works, near Summercourt. Nanpean and St Dennis villages in the background. Photo © Cornwall County Council Historic Environment Service.