

Devon's Minerals - China Clay



Devon County Minerals and Waste Development Framework

What is China Clay?

Otherwise known as kaolin, china clay owes its existence to *kaolinisation*, a process whereby feldspar in granite is weathered by hydrothermal activity to produce kaolinite. The other principal minerals in granite, mica and quartz, remain unaltered during kaolinisation which means these form waste products during china clay extraction. Kaolinite gives china clay its fineness and whiteness. Particle variation affects china clay's strength, colour and plasticity. It is also characterised by its chemical inertness and an absence of coarse impurities. China clay deposits lie relatively deep, typically at up to 100 metres.

China clay is traditionally extracted through hydraulic mining but currently dry mining is also employed. Overlying rock is removed to expose the underlying clay bearing rock. In hydraulic mining a high pressure jet is directed at the pit face dislodging the china clay and other minerals. This forms a slurry which is then filtered to removed the finer sand grains. The remaining clay is then refined.



Lee Moor Quarry

With dry mining clay and the associated waste materials are removed through mechanical excavation then screened, the remaining material then being disaggregated with hydraulic jets. The clay slurry is piped to settling tanks where the larger particles are removed, and the liquid clay is then filtered and dried by thermal driers to reduce the water content to leave a final product which can be sold as powder or pellets. Large quantities of waste result from the production process accounting for approximately 90% of the total quarried material. The sand and crushed rock overlying and within the clay reserves are an important supply of secondary aggregates.

What is China Clay used for?

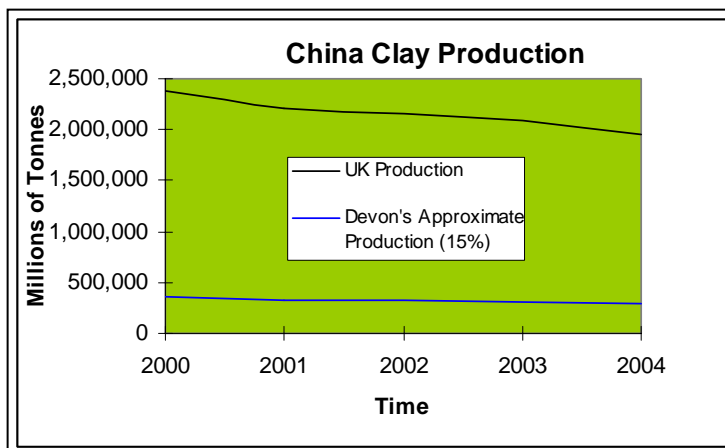
China clay derives value from its inertness, whiteness and fine particle size which can be engineered to suit. It is predominantly used in the paper industry as a white pigment and finisher giving paper its slightly shiny, smooth texture, and is also used as a filler in the actual paper structure. Like ball clay, it is employed widely in ceramics where it is used as a whitening agent for sanitary ware and table ware and also in electrical porcelain and for glazes. It is utilized in pharmaceuticals such as toothpaste and also as a "performance mineral" in paints, rubber, plastics, white cements and sealants. This large range of uses means Devon's china clay production is of national and international importance; the UK is currently the World's third largest supplier of china clay, exporting approximately 88% of its yield. Large china clay markets are the UK, Western Europe and Asia. It is thought that the local economies of Devon and Cornwall derive about £150 million annually from the china clay industry.

Where is China Clay found in Devon?

In the UK, china clay is found solely in the South West of England because of the specific characteristics of the large amounts of granite in the region. This granite is part of a large subterranean batholith (balloon like dome of once molten rock) which has created the high moors of the region. In Devon, china clay is found on the south-west fringe of Dartmoor at Lee Moor Quarry although it has been worked elsewhere in the past. There are also large reserves in the St Austell area of Cornwall.

How much China Clay is found and produced in Devon?

UK sales of china clay reached 1.9 million tonnes in 2004, with approximately 15% of this originating in Devon. Sales have experienced a significant reduction since the boom of the late 1980s when production topped 3.5 million tonnes. This decline has coincided with increased production in other parts of the world, notably Brazil and China.



Source: BGS Minerals Yearbook. 2005

Figures for the existing permitted reserves of china clay are unavailable for commercial reasons. However it is estimated that at current production levels (which are declining) there are 40 years worth of permitted china clay reserves.

China clay reserves run along fissures in the rock meaning that deposits can occur at up to 300 metres depth. Currently most extraction is carried out at up to around 80 metres.

Technological advances allowing deeper extraction could increase the amount of workable china clay in Devon in the future. Future extraction could be compromised however, by the lack of space for the tipping and disposal of waste material which, as mentioned earlier is considerable.

Inappropriate tipping could in fact sterilise existing reserves if disposal occurs in the active areas of quarries or in areas of known mineral reserve.



Shaugh Moor Quarry