Office of the Deputy Prime Minister
Creating sustainable communities

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Mineral Planning Factsheet

Miscellaneous

*The purpose of this factsheet is to provide an overview of selected **miscellaneous minerals**. It forms part of a series on economically-important industrial minerals, excluding aggregates, that are extracted in England. It is primarily intended to inform the land-use planning process.*

Talc and serpentine

Talc is a hydrated magnesium silicate mineral with a characteristic soft and greasy feel, hence its alternative name, soapstone. Commercial grades contain variable amounts of talc and associated minerals. Talc has not been produced on any significant scale in England and there are no resources of any importance. The only source of talc in the UK is on the island of Unst in the Shetland Islands, where small quantities (about 5 000 t/y) of low-grade talc are produced for coating fertiliser prills.

At Polyphant near Launceston in Cornwall a highly altered, soft igneous rock has been worked at least from Norman times as an ornamental stone (Polyphant Stone) for carvings in churches and other buildings. Very minor quantities are produced since time to time for use as a sculpture stone. The small intrusion has been extensively altered over geological time and the rock contains about 40% talc. It has been investigated in the past as a potential source of low-grade talc. However, the rock is too highly contaminated with iron oxides to be of economic interest. Small, discontinuous veins of talc occur in the Lizard serpentinite in Cornwall and these have been worked historically on a very small scale.

South Crofty Tin Mine, Cornwall.

Serpentine, as a mineral name, is applied to a group of hydrated magnesium/iron silicate minerals. The principal occurrence of serpentine minerals is a type of altered igneous rock, known as serpentinite. Such rocks are not common in Britain, but in England do occur in the Lizard peninsula in Cornwall. On the Lizard peninsula, serpentinite is worked for ornamental use and supports a small local industry producing souvenirs. Although planning permissions cover a large area within the Lizard Area of Outstanding Natural Beauty, operations consist of very small, short-term pits within limited areas of the permission.

There are no currently no significant planning issues associated with the extraction of either talc or serpentine.

Iron ore

There has been a long history of iron ore extraction in England with peak output of 20 million tonnes in 1942. Substantial, although declining, production continued until 1980 when the Corby Works in Northamptonshire was closed. The Corby Works was the last integrated iron and steel plant in the UK based entirely on domestic ore. Small-scale extraction of ironstone continued at Scunthorpe until 1988 and near Banbury in Oxfordshire until 1992, the latter for use at the Llanwern Works in South Wales. In both cases the ironstone was primarily valued for its fluxing properties (lime content) rather than iron content. All of these operations were based on ironstones of Jurassic age. Iron and steel manufacture in the UK is now based entirely on imported iron ore (about 15 Mt/y), although

iron and steel scrap continues to be an important element of supply.

Although a wide range of iron ores have been worked in Britain, the principal ores extracted during the 20th Century were of two main types. The first were the Mesozoic (mainly Jurassic) sedimentary ironstones of central and eastern England. These occur as flat-lying beds of wide lateral extent but of limited thickness (<10 m). The ores were of low grade (< 40% Fe), and had relatively high phosphorus contents. The second were the replacement hematite (Fe_2O_3) deposits that occur principally in Carboniferous limestones. The most important of these occur in west and south Cumbria, although similar deposits were also worked in South Wales. The deposits have iron contents of about 45-55% Fe and very low phosphorus contents. Their extent is small compared with the Jurassic ironstones and they were worked almost entirely by underground mining. The last hematite mine, the linked Florence-Beckermet Mine, near Egremont, closed in 1980. However, small-scale mining at the Florence Mine was revived shortly afterwards and continues to the present day. The hematite is not used for ironmaking but as a pigment and in the heat treatment of certain types of cast iron. Production is modest at about 1 000 tonnes a year. The Florence Mine is also a tourist attraction and a well-known source of mineral specimens.

Large resources of Jurassic ironstone remain but they are of a grade and quality that are unsuitable for use by modern iron and steel-making technology. The hematite deposits are essentially exhausted. It is difficult to envisage any economic circumstances in which large-scale iron ore extraction would be revived for ironmaking. However, extensive planning permissions remain in some counties for the extraction of ironstone and 'overlying minerals.' In some counties, such as Northamptonshire, this includes limestone, which is used as a source of crushed rock aggregate. In Oxfordshire, ironstones near Banbury are an important local source of crushed rock aggregate as well as building stone.

The planning issues associated with the extraction of iron ore are minimal. However, ironstones permissions have been used to extract both ironstone and overlying minerals, such as limestone, as crushed rock.

Other metal ores

Metalliferous minerals were formerly extensively mined in Britain, mainly from vein deposits, which occur as linear, sub-vertical deposits infilling faults and fissures that cut rocks of various geological ages. Vein deposits were worked in Cornwall and Devon, the Mendips, North and Central Wales, Shropshire, the Northern and Southern Pennine Orefields, the Lake District and the Southern Uplands of Scotland. They formed the basis of the non-ferrous metal mining industry in Britain, which reached its zenith in the mid-19th Century when the country was a leading world producer of tin, copper and lead. A number of other metals were also produced including zinc, arsenic, tungsten, silver, gold and antimony. However, the industry gradually declined in the face of the high cost of working this style of mineralisation and competition from lower cost producers overseas. Only modest production survived into the 20th Century. The last mine worked solely for lead and zinc closed in North Wales in 1978 and the last tin mine, South Crofty Mine at Camborne in Cornwall closed in 1998.

Today the only metalliferous mineral extracted is galena (PbS, lead ore), which is derived as a by-product of processing fluorspar ore in the Peak District National Park (see Factsheet on **Fluorspar**). Output is about a 1 000 t/y. Very small amounts of cassiterite (SnO_2, the ore of tin) are produced by tin streaming near St Agnes in Cornwall for use in craft products.

A planning application by Baseresult Holdings Ltd, the owners of the South Crofty Mine and processing plant, in February 2004 to reopen the mine was refused by Cornwall County Council. The application included a housing and leisure complex. Currently the mine is used as a tourist attraction but its future has an important bearing on the redevelopment of the site.

Miscellaneous

Miscellaneous

A large deposit of tungsten and tin at Hemerdon Ball just to the north east of Plymouth in Devon was granted permission for working by openpit methods with the associated tipping of waste in June 1986 for a period of 35 years. However, there are no plans to open the mine and none are anticipated in the foreseeable future. The deposit is the only significant tungsten resource in the UK with indicated resources of 45 million tonnes of ore at 0.18% tungsten and 0.025% tin.

The vein-style mineralization, on which most of the former base metal mining was based, is unlikely to attract commercial interest as a source of metals in the future. This is because of their relatively small size and the high costs of mining such deposits. This does not, however, preclude exploration for other styles of metallic mineralization, such as stratiform base metal sulphide deposits, and disseminated and vein-style gold deposits, that are more amenable to lower cost extraction methods. There continues to be interest in the metallic mineral potential of Britain and mineral local plans need to be sufficiently flexible to take this possibility into account. The planning issues associated with any new discovery would depend on the circumstances, principally location and whether extraction is by surface or underground methods.

Slate powder and granules

Slate is a fine-grained metamorphic rock. It is the metamorphosed equivalent of mudstone and shale and formed by heat and pressure applied to these mudrocks. This results in the formation of a well-marked slaty cleavage due to the recrystallisation and realignment of platy clay minerals along a single set of micron-spaced parallel planes. It is along these planes that the rock can be split and this is the fundamental property of slate, which is of considerable economic importance. Slaty cleavage controls the splitting properties and thickness of slate tiles or flagstones used for roofing or other architectural purposes.

Bodies of commercial slate generally have a restricted occurrence within more extensive masses of less perfectly cleaved rock, which accounts for the large tips of waste material that are commonly associated with slate working. In more general usage, therefore, the term 'slate' may be applied to mudstones exhibiting a weak slaty cleavage that would be unsuitable for cleaving into thin slates. These may cover extensive areas, for example in Cornwall, and may be worked for walling, paving, rockery construction and general fill.

There are large accumulations of slate waste associated with slate working. A small quantity is used in the production of slate powders and granules, which is the subject of this section. Production of slate waste for industrial use is mainly confined to Wales. In England commercial slates are worked in Cornwall and Devon from strata of Devonian age and in the Lake District from rocks of Lower Palaeozoic age, comprising volcanic rocks of the Borrowdale Volcanic Group (Lakeland green slate) and mudstones of the Windermere Supergroup (Lakeland blue slate). Substantial quantities of slate waste may be associated with their production. However, the use of this waste for industrial purposes is confined to the Delabole slate quarry in north Cornwall. Here all the slate that is quarried is either utilised or backfilled. Use of the waste includes the production of slate granules for coating roofing felt, and powders for filler applications, such as in bituminous paints. No slate is produced in the Lake District for industrial purposes.

There are important planning issues associated with the extraction and processing of slate, and the large quantities of waste that may be produced. However, none of these are related to the small quantities of slate produced for industrial purposes. These applications are beneficial in disposing of modest quantities of waste material.

Slate is exempt from the Aggregates Levy and because of this exemption there may be an increasing use of slate waste for aggregate use.

Authorship and acknowledgements

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Mineral Planning Factsheets for a range of other minerals produced in England are available for download from www.mineralsUK.com

Miscellaneous