

Tin Mining

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Associated metals

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Although most tin is obtained from mining tin ores, cassiterite is also found in association with ores of tungsten, tantalum and lead and minor quantities of tin are recovered as by-products of mining these metals.

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Hard rock tin deposits

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Only about 20 percent of the world's tin deposits occur as primary hard-rock veins or lodes. These ores contain predominantly high temperature minerals and commonly occur in close association with silicic granites.

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Placer deposits

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About 80 percent of the world's tin deposits occur not as primary lodes, but as unconsolidated secondary or placer deposits in river beds and valleys or on the sea floor. The largest concentration of both onshore and offshore placers is in the extensive tin belt of South-East Asia, which stretches from China in the north, through Thailand, Burma and Malaysia, to the islands of Indonesia in the south.

Compared with commercially viable deposits of copper, lead, zinc, nickel and bauxite, tin deposits are generally small. Further, tin is almost always found closely allied to the granite from which it originates. .

The important mining areas

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Major tin deposits are confined to a comparatively small number of areas. More than half of the world's tin ore is mined in the great Far Eastern tin field. There are also significant deposits in South America.

Australia

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Tin has been mined in the Herberton area of Far North Queensland since 1888. Hard rock tin, associated with greisen on the top of granitic intrusions and alluvial placer tin are mined with associated tungsten and tantalum minerals.

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Bolivia

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Bolivia has been a significant producer for some years and many of its mines have been producing for over 50 years. Tin deposits are mostly complex

vein systems where the cassiterite is inter-mixed with sulphides of silver, bismuth and tin. Over 95 percent of tin production is derived from hard rock deposits, almost all of which is exploited by underground exploration.

All of the major tin mines are located in the Andean Cordillera of western Bolivia. Most of the mines are situated at heights of between 3,500 and 4,800 metres above sea level on the high plateau area known as the Altiplano. These mines are high cost producers and the quality of the ore grade produced has been declining for some years. Bolivia has been overtaken in recent years by Brazil as a major supplier of tin.

Brazil

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In 1990 Brazil was the world's largest producer of tin-in-ore. Almost 90% of the country's production is obtained from the Pitinga mine about 300 km northeast of Manaus in the Mapuere region of the state of Amazonas.

The high grade alluvial deposits at Pitinga were discovered at the end of the 1970s in the course of a five-year exploration programme. These deposits are shallow with a maximum working depth for dredging of six metres. Simultaneous excavation and suction dredging is capable of mining very low grades of tin, thus greatly increasing the economic ore reserves. Low mining costs have allowed production to remain profitable even when tin prices have been low as in the last few years.

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Thailand

The modern commercial production of tin in Thailand began in about 1870, but it was not until the early part of the 20th century that the country became a significant producer. Most of the tin produced in Thailand has been produced in the southern provinces in the Malay Peninsula. The major ore reserves are cassiterite but substantial quantities of columbite and tantalite also occur.

Thailand was the first country to employ the dredge for offshore tin mining in 1907 and onshore and offshore dredging still accounts for about 27 percent of total production, by the late 1980s. Gravel pump mining became much more important during the 1950s and 1960s as new power-driven machinery replaced the older inefficient recovery systems.

Malaysia

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Malaysia's principal tin deposits occur in a strip of land about 400 km long and 60 km wide between the towns of Georgetown and Melaka, along the western coast of Peninsular Malaysia.

Most Malaysian tin comes from two states, Perak and Selangor, which together account for about 90 percent of the country's tin mining output; tin has been produced in Malaysia for more than 2,000 years.

The principal methods of mining are by gravel pump and dredging which account for about 80 percent of total mine output. However during the 1980s there was a substantial fall in the number of gravel pump producers, as it became uneconomic to produce tin in such small mining units in view of the low world price.

Indonesia

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Indonesia produces tin mainly from alluvial deposits and the country's major reserves are located in the offshore areas of Bangka Island. Commercial exploitation of tin resources began on Bangka Island in the eighteenth century, but the introduction of large scale dredging operations in the early part of this century established Indonesia as a major efficient low cost producer.

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China

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China is also one of the major tin-producing countries; the main producing area is the Gejiu complex in Yunnan which has accounted for a large proportion of the total output in China for many years.

Total mined production of tin in 1990 (as ores and concentrates) was 211,000 tonnes, with the major producing nations being Brazil, China, Indonesia, Malaysia, Bolivia and Thailand.

England - Cornish tin

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Cornwall has a long history as a leading producer. Cornish tin deposits have been worked extensively for many centuries, dating back to at least Roman times; there is in fact strong evidence of tin working in Cornwall from the early Bronze Age, 2100-1500BC.

Even after the Romans reached Cornwall however, tin must have been scarce and costly. There are actually few historical references to the tin trade of the Phoenicians, Greeks, Gauls or Romans. Brief statements about production were made from time to time after 1066 in Stannary Court Proceedings, charters and other official documents.

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Tin mining was undoubtedly the most important of the various non-agricultural economic activities in Cornwall in the middle ages and it was part of a highly diversified economic structure. Many Cornishmen were engaged in overseas trade and shipping as well as agriculture during this period.

Cornwall seems to have been one of the world's leading sources of tin for much of its known history, and certainly until the late 19th century. However, output has fluctuated markedly with the economic fortunes of the region. In the 14th century, output reached an annual peak of 600 tonnes.

By the middle of the 19th century Cornwall reached its peak production of about 9,000 tonnes, but by the early 1890s production had fallen to between 4,000 to 5,000 tonnes per year. Output fell further in the first half of this century when the low-cost alluvial resources in South-East Asia became the world's principal source of tin.

Production fell to a low point of 1,000 tonnes per annum in the 1950s but recovered to over 5,000 tonnes per annum in 1984 and 1985, due to the higher world market price. However, following the collapse of world tin prices in late 1985, Cornish mines were gradually closed down and now (1997) the last mine operating at South Crofty, producing around 1,100 tonnes of tin-in-concentrate, is threatened with closure. The largest operating mine currently in Europe is the Neves-Corvo complex in Portugal where both tin and copper are extracted.

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<http://earthsci.org/mineral/mindep/depfile/tin.htm>