

Building and construction minerals

Asbestos

Asbestos is the general name for a group of six fibrous minerals of which chrysotile (white asbestos) is the most important. Chrysotile accounts for about 95% of world asbestos production, due primarily to its resistance to heat and its high flexibility and tensile strength. Up to 1983 chrysotile was mined at **Woodsreef** near Barraba (N.S.W.) but all domestic asbestos requirements are now met by imports.

Gypsum

Gypsum is the naturally occurring dihydrate form of calcium sulphate. Current annual production of gypsum amounts to around 1.7 Mt of which about one quarter is exported.

Its ability to readily give up water when heated and to absorb it again at normal temperatures makes gypsum particularly suitable for manufacturing plaster, its most common industrial use. Gypsum has other important uses—as a retarder in cement and as a soil conditioner.

In Australia the as-mined material generally contains 90–98% gypsum. Principal centres of production are **Lake MacDonnell** and **Kangaroo Island** (S.A.), and **Useless Loop** and **Lake Cowan** (W.A.). Other areas of production include **Lake Brown**, **Lake Seabrook**, **Lake Hillman** and **Cowcowing Lakes** (W.A.); **Morgan**, **Blanchetown**, **Cooke Plains**, **Lake Fowler** and **Stenhouse Bay** (S.A.); **Nowingi** and **Cowangie** (Vic.); and **Paka** (N.S.W.).

Gypsum is also a by-product of processing phosphate rock to phosphoric acid in the manufacture of fertiliser.

Limestone

Limestone (or marble, its metamorphosed equivalent) is the basic raw material for a number of important industrial commodities, notably cement and lime. Together with salt, limestone is also used in the manufacture of sodium carbonate (soda ash), a widely used industrial chemical. Large quantities of raw limestone are used as a metallurgical flux, especially in the iron and steel industry, and in various agricultural applications.

About two-thirds of Australia's annual production of around 10 Mt of limestone is used to manufacture cement. Limestone is mined in all states though New South Wales is the largest producer (3.4 Mt in 1986), principally from **Marulan South** and from mines in the **Kandos-Portland** area west of Sydney.

In general, limestone deposits are worked mainly near major cities and industrial centres to minimise transport costs, for example **Calcium** near Townsville and **Mount Larcom** near Gladstone in Queensland; **Marulan South** near the Port Kembla iron and steel works and the cement works at Berrima and Maldon; **Angaston**, **Rapid Bay** and **Klein Point** near Adelaide; and **Wanneroo** near Perth.

Exports of raw limestone are insignificant though exports of cement (which accounts for about two-thirds of total limestone output) average around 200 000 t per annum. About 1 Mt of limestone is imported annually from Japan as backloaded raw material for the domestic iron and steel industry.

Chemical and fertiliser minerals

Phosphate

Australia's phosphate requirements, used almost exclusively for the manufacture of superphosphate fertiliser, are met entirely by imports.

Very large phosphate deposits were discovered in 1966 in the Georgina Basin in north-western Queensland. One of the largest of these, the **Phosphate Hill** deposit, was brought into production in 1975, producing a so-called 'direct-shipping-grade' rock by open-cut selective mining. However, Australian superphosphate manufacturers resisted using it because their plants were geared to imported rock with different characteristics. This factor plus a poor export outlook led to the cessation of mining in 1982, after several years of only intermittent production.

The mine at Phosphate Hill has been on care-and-maintenance since 1983 and subsequent production represents sales from existing stockpiles. Investigations are continuing into the feasibility of producing phosphoric acid and a high grade fertiliser product utilising phosphate rock from Phosphate Hill and by-product sulphuric acid which would be derived from waste smelter gas at Mount Isa.

Salt

Australia's salt industry expanded rapidly in the late 1960s and early 1970s to meet a growing demand by chemical industries for a source of sodium and chlorine. Australia is now the second largest exporter of crude salt, after Mexico.

Salt is recovered as a precipitate, formed by solar evaporation of seawater or underground brines. Salt

is also mined dry, as so-called rock salt, although mining of this type does not occur in Australia.

About 80% of Australian salt production comes from four large export-oriented operations based on solar evaporation of seawater at **Useless Loop**, **Lake Macleod**, **Dampier** and **Port Hedland** in north-west Western Australia. Total production in 1986 amounted to just over 6 Mt.

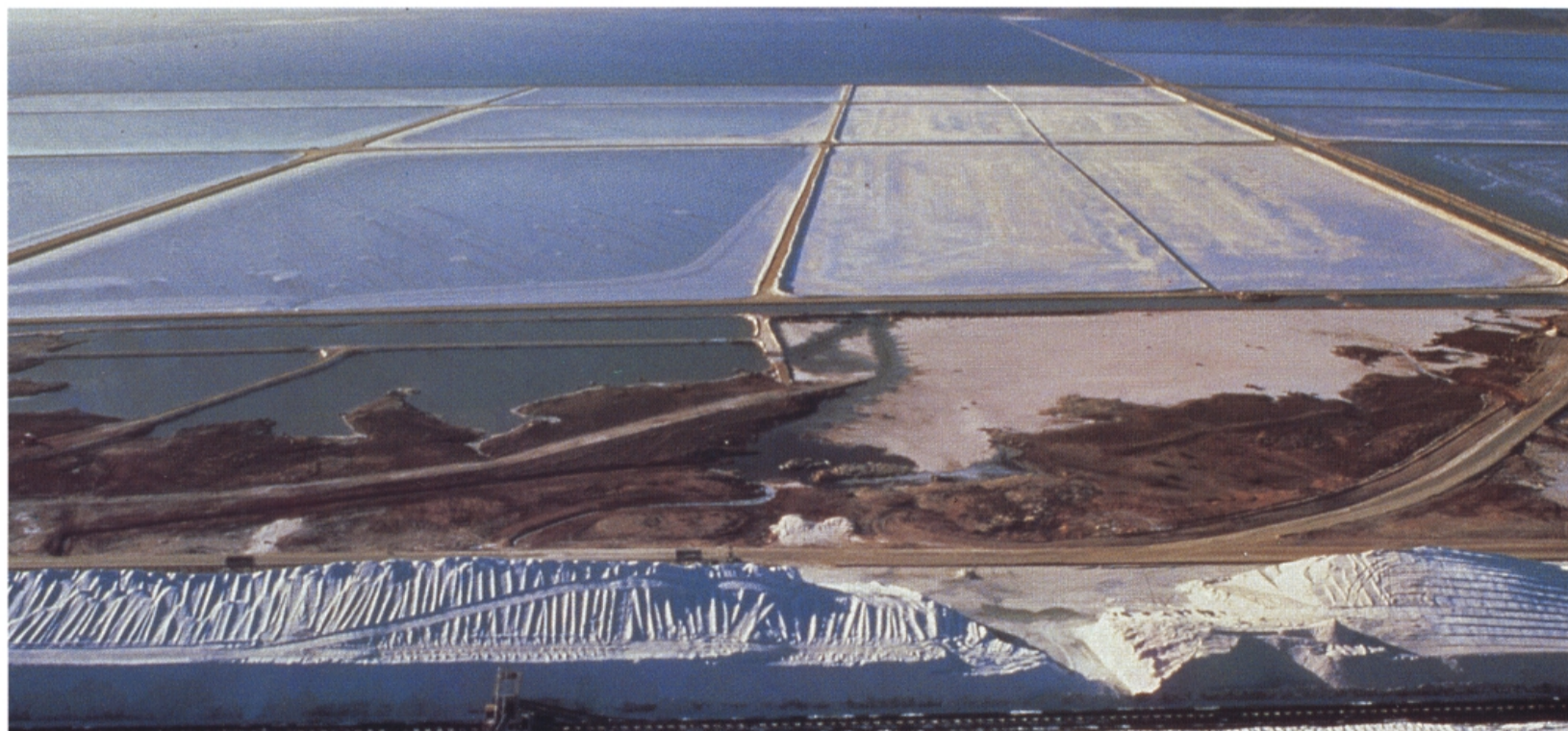
Australia's own salt requirements are supplied mainly by similar though smaller operations at **Dry Creek** (S.A.) and **Geelong** (Vic.), and at **Bajool** (Qld) where production is based on solar evaporation of both underground brines and seawater. About 75% of domestic salt is consumed by the chemical industry; the balance is used in other industrial applications, in food processing and by households.

Sulphur

Australia has no known deposits of elemental sulphur ('brimstone') and is dependent to a large extent on overseas supplies. However, about 35% of domestic sulphur requirements are met by sulphuric acid recovered as a by-product at smelters processing indigenous metallic sulphides: from lead concentrates at **Port Pirie**; from zinc concentrates at **Risdon**; and from lead and zinc concentrates at **Cockle Creek**.

Total annual production of sulphuric acid amounts to nearly 2 Mt, most of which is consumed in the manufacture of superphosphate.

Sulphur is also recovered as ammonium sulphate from nickel refining at **Kwinana**. In addition small amounts of elemental sulphur are recovered during oil refining at some Australian refineries.



Crystalliser ponds and stockpiled salt at the **Dampier field** (W.A.) Seawater is pumped into large solar evaporating ponds (just visible in the background) and then transferred into the adjacent crystalliser ponds where the salt is precipitated. During the hot summer months about 1 Mt of moisture evaporates each day. After harvesting, the salt is hauled by road trains to nearby stockpiles for washing and drying. In total the Dampier salt field, Australia's largest, covers 9000 hectares and produces around 2 Mt of salt annually.

Deposits of the most commonly used materials for building and construction—sand, gravel and stone—are not shown on the map 'Minerals other than Fuels' nor discussed here because, although widespread, they are usually worked only in the vicinity of the very large population centres.