



NSW DEPARTMENT OF  
**PRIMARY INDUSTRIES**

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## Potential and Outlook

In New South Wales the only significant occurrences of sulphur are as sulphide in base metal deposits, or as secondary minerals in coal seams. Deposits of native elemental sulphur are unknown. Potential for sulphur in New South Wales is limited to its recovery from the processing of sulphide ores and possibly from future petroleum production.

## Nature and Occurrence

Sulphur can either be found as monomineralic native sulphur or in combination with other elements. Sulphur is a major raw ingredient in the chemical industry, especially in the production of sulphuric acid used in large quantities in many applications.

## Deposit Types

Native sulphur occurs in subsurface salt domes (associated with gypsum and anhydrite), in evaporative deposits in sedimentary rocks, and as precipitates in and around volcanoes and mineral springs. Sulphur compounds occur in the form of sulphide minerals, such as pyrite, pyrrhotite, galena, sphalerite and marcasite; sulphate minerals (such as gypsum and anhydrite); and hydrogen sulphide (a contaminant in natural gas). Petroleum, tar sands and oil shale contain significant amounts of sulphur in the form of organic compounds and pyrite.

In 2004, world consumption of sulphur in all forms was about 63 Mt (Ober 2005). The major producers were the USA, Canada, Russia, China, Japan, Saudi Arabia and Kazakhstan. Resources of elemental sulphur in evaporite and volcanic deposits, and sulphur associated with natural gas, petroleum, tar sands and metal sulphides, total 5 Gt. Very large resources of sulphur also occur in gypsum and anhydrite, coal and oil shale, although economic extraction of sulphur from such deposits is not viable.

## New South Wales Occurrences

The only significant occurrences of sulphur in New South Wales are as sulphide in base metal ore deposits — for example, at Broken Hill, Cobar and Elura.

## Applications

Crude sulphur (elemental sulphur or brimstone), which is used in either liquid or cooled solid state, has a minimum sulphur content of 99.55%. The only impurity is carbon (present as hydrocarbons in trace amounts) dispersed throughout the sulphur. Elemental sulphur is used in production of vulcanisation agents, sulphur dyes, pharmaceuticals, specialised concretes and pyrotechnics (Harben & Kužvart 1996).

Most sulphur is converted to sulphuric acid, which is the largest-volume inorganic chemical used in commerce because of its low cost, availability and versatility. Almost two-thirds of sulphur consumption (as sulphuric acid) is used in the manufacture of phosphate fertilisers and other agricultural chemicals.

## Economic Factors

Sulphur is used in a wide variety of applications and its consumption is controlled by market forces (Harben 1999). Production of elemental sulphur and pyrite (discretionary production) is declining as more sulphur is recovered from industrial processes (non-discretionary production), to reduce sulphur dioxide emissions, particularly in petroleum refineries and metallurgical plants. Elemental sulphur deposits are largely uncompetitive. Sulphur from petroleum and metal sulphides may be recovered where it is refined, which may be the country of origin or in an importing nation.

## References

- HARBEN P.W. 1999. *The industrial minerals handybook*. 3<sup>rd</sup> edition. Industrial Minerals Information Ltd, London.
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- OBER J.A. 2005. Sulfur. *In*: United States Geological Survey, compiler. *Mineral Commodity Summaries 2005*, pp. 162–163. United States Department of the Interior.