

### History

Copper is one of the oldest metals known to humanity, with the earliest recorded use dating back almost 10,000 years, only gold and meteoric iron<sup>i</sup> having been used by humans earlier. The first metal tools were made with copper, beginning our long love affair with metalworking and taking the first steps on the long journey to the modern world.<sup>ii</sup>

### Geology

Copper is found in both mineralised and natural forms, meaning that it can be found as a mineral ore as well as a natural metal nugget like gold. Copper is highly reactive with other minerals and is often found in deposits with other metals such as lead, zinc, gold and silver. Copper in Australia is usually found as the mineral Chalcopyrite in rocks which are over 250 million years old<sup>iii</sup>. Other less commonly occurring minerals that contain copper are Azurite and Malachite.

The largest copper deposits are known as porphyry copper deposits which originated millions of years ago as large masses of molten rock which cooled and solidified deep in the Earth's crust. As the molten rock cooled, crystallised and hardened the copper remained fluid, getting more and more concentrated as the rock cooled. As the rock cooled and hardened the remaining copper-rich fluid was squeezed into cracks that developed in the cooling process. Once the fluid solidifies the copper deposit has been formed. Over many millions of years, erosion and geological movements remove the rocks that have covered these deposits and they eventually appeared at or near the surface where they can be identified and mined<sup>iv</sup>.

### Victoria

Most of the copper mined in Victoria has come from four parts of the State<sup>v</sup>. In northeast Victoria, at the Wilga mine near Benambra, there is a copper-zinc-lead-silver-gold deposit. There is also a high sulphide zone to the west of Bethanga. Other ore deposits that have been mined in the past include a copper-silver-gold-platinum deposit at Thomson River near Walhalla and another at Accommodation Creek near Deddick.



A native copper nugget.  
Source: Wikimedia Commons

Research undertaken by GeoScience Victoria has identified an inferred resource of approximately 1 million tonnes containing 2.7% copper at Mount Ararat in western Victoria<sup>vi</sup>. The research also identified the Mount Stavely prospect, southwest of Ararat, with an inferred resource of 10.6 million tonnes containing 0.45% copper. At present there is no copper mine in operation in Victoria. The price of copper has increased fourfold in the past decade which will hopefully encourage development.

The Wilga mine portal has been re-opened as part of the development for the Stockman Project which plans to access the large copper-zinc-lead-silver-gold deposit there<sup>vii</sup>.



## Uses

There is immense demand for copper as it continues to be one of the most useful and widely used metals. It is often combined with other metals to make a huge array of alloys for different uses, the most common being brass (copper–zinc) and bronze (copper–tin). Copper is a brilliant conductor of heat and highly ductile which allows it to be used to make electrical wiring and circuitry, which accounts for about 60 per cent of world copper usage<sup>viii</sup>. Copper is also used for roofing and plumbing.

With the rapid modernisation of the developing world, most specifically China, global demand for copper is forecast to remain strong. The need to plumb and wire China's massive urban centres as tens of millions of people enter the global middle class will require millions of tonnes of copper. Global demand has pressured supply over the past decade which has led to a significant increase in copper prices. Considering Victoria's relatively unexploited deposits this represents a significant opportunity for the State and the minerals industry.

A spool of fine copper wire  
Source: Wikimedia Commons

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<sup>i</sup> The metal taken from iron meteorites, mainly a nickel–iron alloys. This was one of the earliest sources of usable iron available to humans.

<sup>ii</sup> Stanczak, M. (2005) *CSA – Discovery Guides, A Brief History of Copper* <http://www.csa.com/discoveryguides/copper/overview.php>.

<sup>iii</sup> Australian Mines Atlas, *Copper in Australia* [http://www.australianminesatlas.gov.au/education/down\\_under/copper/australia.html](http://www.australianminesatlas.gov.au/education/down_under/copper/australia.html)

<sup>iv</sup> Australian Mines Atlas, *How Copper deposits are formed*, [http://www.australianminesatlas.gov.au/education/down\\_under/copper/formed.html](http://www.australianminesatlas.gov.au/education/down_under/copper/formed.html)

<sup>v</sup> Victorian Department of Primary Industries (DPI) (2012), *Earth Resources, Copper* <http://www.dpi.vic.gov.au/earth-resources/minerals/metals/copper>

<sup>vi</sup> Ibid DPI.

<sup>vii</sup> Independence Group NL, Stockman Project, <http://www.igo.com.au/irm/content/stockman.html>

<sup>viii</sup> International Copper Association Australia (2012), *Copper: the Essential Metal*, <http://www.copper.com.au/copper/wcms/en/home/education/history/coppertheessentialmetal.html>