Platinum in South Africa

In the 18th century, European chemists recognized platinum as a new element.

By Dan Oancea

Platinum was first used in jewelry by the ancient populations of Egypt and by pre-Inca civilizations in Central America. Spaniards explored the pre-Inca sources, where platinum laced river beds; however, they considered the white metal to be a nuisance because it was impossible to melt it and separate it from gold. Indeed, the Spanish alchemists considered platinum to be "unripe gold"; they threw it back into the rivers to "give it the opportunity to ripen."

In the 18th century, European chemists recognized platinum as a new element and managed to melt it by mixing it with arsenic and employing oxygen furnaces. Shortly thereafter, the French monarch, King Louis XVI, declared that platinum was the only metal "fit for kings."

Until the early 19th century, Colombia was the world's key platinum producer. Then, the rich, platinum-bearing, alluvial deposits of the Ural Mountains of Russia were discovered, which subsequently led the world in platinum production for the next 100 years. These deposits were then eclipsed by the nickel-copper ores of the Sudbury basin in Canada, which became the world's main source of platinum from the 1920s to the 1950s.

In 1865, chromites were first identified by the German explorer Karl Mauch in the Hex River area near Rustenburg, South Africa, while in 1885, a Pretoria-based prospector identified samples of ore containing "platina." Then, in 1906, a chemist reported platinum in stamp mill concentrates from a gold mine in Klerksdorp, located in what is now known as the Bushveld Igneous Complex. Other chromites of the Bushveld Igneous Complex were subsequently documented and started to be mined at the beginning of the 20th century.

In 1924, Andries Lombaard, an eastern Bushveld farmer, found a white metal in hand-panned concentrates on his property. Lombard sent samples to geologist Hans Merensky, who realized that Andries' platinum grains were larger then those usually reported as coming from chromitite layers – he thought of them as being derived from another rock type source. Over the next two years, Merensky managed to identify a strike length of over 100 km for two platinum deposits hosted by the Bushveld Igneous Complex. The main reef now bears his name in recognition of his identification. The Merensky Reef was first mined for platinum in 1925 and has provided most of the world's platinum since then. However, it was not until the 1970s that metallurgical problems with the chromitite ores of the Upper Group 2 (UG2) reef were overcome and they became an additional economic platinum source.

The Bushveld Igneous Complex is now known to be a 370-kilometer-diameter saucer-like structure, the centre of which is buried, while its irregular eastern and western rims are exposed. The Merensky and the UG2 reefs outcrop on both exposed rims, while the Platreef occurs on the north-east part of the structure in the so-called Potgietersrus limb.

Manual and mechanical underground mining methods are employed to mine the narrow reefs, typically less

than 1 m thick. The reefs are mined by open pit where they outcrop. In addition, the Platreef, being thicker, is also mined by open pit. Typical head grades for Bushveld ores are 3 to 6 grams per tonne.

In 1999, Professor Grant Cawthorn of the University of Witwatersrand estimated that the Bushveld Igneous Complex contained proven and probable reserves of 203.3 million ounces of platinum and 116.1 million ounces of palladium, while inferred resources were calculated at 939 million ounces of platinum and 711 million ounces of palladium. These reserves and resources make up about 88% of the world's total platinum resources.

As of 2008, Rustenburg, Impala, Bafokeng Rasimone, Union, Amandelbult, Northam, Elandsfontein, Crocodile River, Pandora, Lonmin, Marikana and Kroondal are active platinum mines of the Western Bushveld. Pilanesberg is expected to come on stream in 2008, while Wesizwe's Frishgewaagd Ledig mine and, possibly, the Leeuwkop project, are scheduled to start construction soon.

Mines of the Eastern Bushveld comprise Lebowa, Twickenham, Marula, Modikwa, Two Rivers, Mototolo, Everest, Limpopo and Mogalakwena. The Smokey Hills and the Blue Ridge mines are about to start operating in 2008. Ga-Phasha, Kennedy's Vale, Sheba's Ridge and Booysendal represent new Eastern Bushveld mining development projects.

In recent years, South African platinum production peaked in 2006, falling by 260,000 ounces to 5.04 million ounces in 2007 bringing the total platinum market deficit to 480,000 ounces. Nevertheless, South African platinum production currently comprises 80% of worldwide output indicative of the geological importance of the Bushveld Igneous Complex.

High worldwide demand for platinum is anticipated to continue, due primarily to its use in "green" applications (such as autocatalysts). Unfortunately, the South African mining industry continues to suffer from disruptions due to power interruptions, strikes, high labor turnover, absenteeism, contractor problems and a poor safety record. It is hoped that South Africa, as a nation, will overcome these problems and continue to feed the worlds growing demand for platinum.

Links and References

- Alchemists
- Alluvial deposits
- Amandelbult
- Arsenic
- Bafokeng Rasimone
- Blue Ridge
- Booysendal
- Bushveld Igneous Complex
- Canada
- Chromites
- Chromitite
- Colombia
- Concentrates
- Copper
- Crocodile River
- Elandsfontein
- Everest
- France
- Frishgewaagd Ledig
- Ga-Phasha
- Gold
- Hans Merensky
- Head Grades
- Impala
- Karl Mauch
- Kennedy's Vale
- Klerksdorp
- Kroondal
- Lebowa
- Leeuwkop
- Limpopo
- Lonmin
- Marula
- Marikana
- Modikwa
- Mototolo
- Nickel
- Northam
- Open Pit Mining
- Oxygen furnaces
- Palladium
- Pandora
- Pilanesberg
- Platinum
- Platinum Group Metals
- Platinum Mines
- Platreef
- Professor Grant Cawthorn
- Reef
- Russia
- Rustenburg
- Sheba's Ridge
- Smokey Hills
- South Africa
- Sudbury Basin
- Twickenham
- Two Rivers
- Union

Click here for full list of links: http://go.mining.com/sept08-a8