PLATINUM IN THE KIMBERLEY: GEOLOGY, PROSPECTS, AND POTENTIAL MINES

On 7 April 2004, John Bunting, a consulting geologist, and John Lewins, from Platinum Australia, presented an interesting and very detailed talk to the Kimberley Society. A summary of John Bunting's component of the illustrated talk follows. The six platinum group elements are platinum (Pt), palladium (Pd), rhodium (Rh), iridium (Ir), ruthenium (Ru) and Osmium (Os). All are very rare, but they have physical and chemical properties such as high density, hardness, lustre, melting points and catalytic capacity that make them essential in modern living – uses such as jewellery, emission control (catalytic converters), dental products, electronics and, potentially, fuel cells. They are also very valuable – at about A$1000/oz platinum is twice the price of gold, which means it is also held as an investment.

Supply is dominated by South Africa, Russia and North America, with the only WA production being a minor by-product of nickel mining. Exploration geologists are, however, optimists, and there is ongoing exploration for platinum in WA (from here on I'll use the term "platinum" to mean the platinum group elements). Now a few words about how platinum occurs. Platinum in the earth's crust is normally measured in parts per billion, with economic concentrations generally about 2 to 10 parts per million (or grams per tonne) – i.e. similar to gold. Economic deposits are found mainly in layered mafic-ultramafic intrusions, which are large bodies of igneous rock, often several kilometres thick and tens to hundreds of square kilometres in area. The rocks crystallised deep in the crust from a magma that was similar to the basalt lavas that erupt from modern volcanoes. In the magma chamber the early formed minerals are rich in magnesium and iron. These settle out to form an ultramafic base, leaving a less dense magma to crystallise as gabbro (mafic) in the upper part of the chamber. Platinum is found in layers in the lower part of the intrusion, commonly associated with chromite (a chromium-iron oxide), or in nickel-copper sulphides at the base of the intrusion.

In the Kimberley region the main platinum-bearing layered intrusions are in the Halls Creek Orogen – a linear belt of igneous and metamorphic rocks, about 1800 million years old, that stretches from Kununurra to the SW of Halls Creek. Most of the platinum is associated with chromite layers. The biggest resource found so far is the Panton deposit, about 50 kilometres north of Halls Creek. As described by John Lewins in the second talk of the evening, a feasibility study by Platinum Australia Ltd initially showed that a viable mining operation was possible, but falling metal process, especially palladium, and high fuel costs have resulted in mining being delayed. Exploration by Platinum Australia and other companies has found platinum-bearing chromite layers in other intrusions, such as Big Ben, Eastman, Lamboo, Melon Patch and Mini M.

Sally Malay, about 100 kilometres north of Halls Creek, is an example of platinum as a by-product of nickel mining. Sally Malay Mining Ltd has identified a reserve of 3.4 million tonnes at 1.5% Ni, 0.64% Cu plus platinum in sulphides at the base of the intrusion. Open-pit mining started in February 2004, with the first shipment of metal concentrate and the start of underground mining planned for September 2004. Similar platinum-bearing sulphides have been found by other companies at Copernicus, Salk North and Eileen Bore.

There seems little doubt that with further successful exploration, innovative metallurgy and improved economic conditions, we will eventually see an operating platinum mine in the Kimberley region.