

DIAMONDS IN THE KIMBERLEY

A very interesting talk was given at the fourth meeting of the Society on 20 July 1994 by Mr Andrew Murray, Manager – Corporate Services, Argyle Diamonds, Australia.

He said that diamonds are formed of pure carbon with a Specific Gravity of 3.5 and a Moh's Hardness of 10, making them the hardest known naturally occurring substance. They have a high Refractive Index and dispersion. The latter is responsible for the brilliance of diamonds, with perfect diamonds dispersing virtually 100% of the light entering them.

With some trepidation (there were at least two geologists in the audience!) he gave some background on the formation and occurrence of diamonds. They are formed under intense heat and pressure at a depth of about 200 km deep in the earth's Mantle, there being two types of magma, kimberlite and lamproite. These magmas are transported to the surface by volcanic processes, forming pipes. Up to 1979, the only occurrences of diamonds in the world were in kimberlites, however, in that year they were discovered in lamproites in WA.

Andrew Murray pointed out that diamonds had been known in Australia since at least 1851, with a few being found in WA at Nullagine in 1985. The first diamond indicator minerals were found in the West Kimberley in 1973 and later in the same year the first actual diamonds were discovered at Ellendale in the West Kimberley.

Although research has shown that there were possibly as many as 13 pipes at Argyle, weathering of the Kimberley block over many millions of years has reduced them to only one lamproite pipe, known as AK1. This pipe was discovered in 1979 by following alluvial diamonds up a creek bed. It took a further 6 years for production to commence from an open pit in the AK1 pipe, yielding 5 to 8 carats per tonne, which is very high by world standards. Alluvial diamonds were also mined at Argyle in 1983-85, recommencing in 1989. Andrew gave interesting statistics, 40 million tonnes of earth and rock are removed to give 8 million tonnes of ore from which 40 million carats of diamonds are obtained. He said that some of the unweathered lamproite at the AK1 pipe was up to five times as hard as granite.

The ore is crushed to an 18mm size and a gravity separation (flotation) process is used to separate the diamonds with a final screening by an x-ray technique. Some diamonds are acid-cleaned. Their shape and quality determine their value: the better diamonds being in the classic crystal form of an octahedron. Half of the production is white, the other half being coloured (champagne, cognac and the highly prized pink-red range). Some 78% of the Argyle production is sold in the

rough form to the Central Selling Organisation (de Beers); the remainder being sold by Argyle on the open world market through Antwerp. Some cutting and polishing of the best diamonds is carried out in West Perth, but the majority of Argyle stones are cut and polished in India with some being done in Thailand and China.

Andrew Murray dealt with personnel issues. The ordinary work force is flown direct from Perth to the mine site by Ansett-WA where they work for 14 days straight. They are then flown back to Perth for a 14 day break. The success of this 'fly-in fly-out' strategy is shown by the fact that about 50% of the original work force is still with the Company, there being only a 3-4% annual turnover! About 10% of the Argyle work force is made up of local Aborigines.

The company is very conscious of environmental matters. With alluvial mining, the soils are carefully removed and stockpiled so that they can be put back in the same profile order with the area then being revegetated from the company's plant nursery. Because baobab trees are considered difficult to re-establish they are left in situ with the Company foregoing any alluvial diamonds underneath them.

The talk was followed by an animated discussion and many questions from the audience.

Lindsay Peet