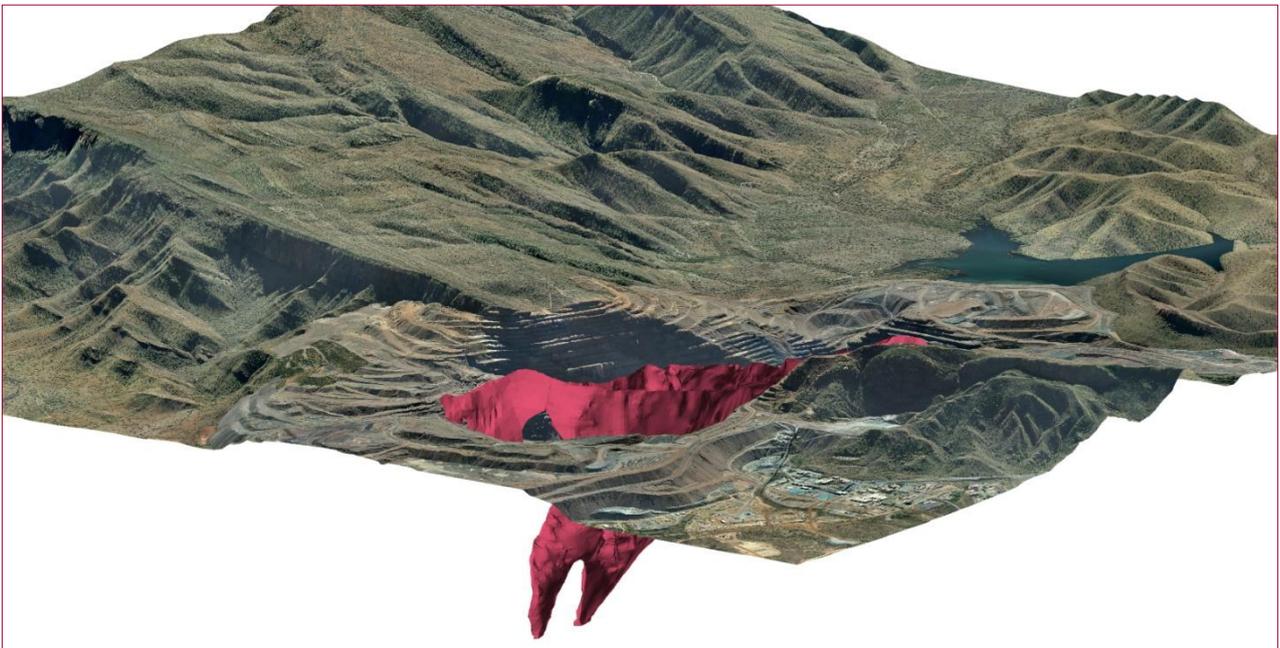


THE GEOLOGICAL HISTORY OF THE ARGYLE DIAMOND DEPOSIT

On 3 July 2014, **Murray Rayner**, Principal adviser - Resource Evaluation at Argyle Diamonds, was our speaker. He opened his talk with a brief outline of the history of diamonds in the Kimberley region. Rather than summarise Murray's outline here, we refer you to an earlier talk on '[The Road to Argyle: A history of diamond exploration in W.A.](#)', delivered by **Ewen Tyler** in August 1997. It was published in the *Boab Bulletin* and is on our website.

Murray explained that diamond pipes form in volcanoes that transport the diamonds from depths of 150-230km to the surface during volcanic eruptions and can range from 50m to a few hundred meters in width and often hundreds of metres in depth. The Argyle site was originally pegged in 1979 following the discovery of alluvial diamonds in Smoke Creek, which had eroded from the Argyle diamond pipe over millions of years. The mining of the alluvial diamonds commenced in 1981 in both Smoke Creek and Limestone Creek, which both ultimately flow into Lake Argyle. In 1983 they started developing the open pit mine, completing its establishment in two years. The open cut mine closed in 2013. More information on the history of the mine is available on the [Rio Tinto website](#).



3D image of the Argyle diamond pipe looking west over the Matsu ranges after 30 years of mining

The challenges of extracting diamonds from the mine in the Kimberley are summarised [here](#). In putting those challenges in context, Murray mentioned that they are matched by Rio Tinto's more recent mining operations such as [Diavik](#) in the North West Territories of Canada. There, only a 6 week period of optimal ice conditions allows for the cartage by road of 12 months of mining supplies on the infamous ice road!

Argyle produces the largest quantity of diamonds in the world given the high grades of carats but, despite not being the highest quality, the birth of the champagne and cognac diamonds evolved. The [coloured diamonds](#), including the rare and very valuable pink form (only one in a thousand stones), are caused by inclusion of nitrogen in the diamond structure. Although diamonds themselves are very hard, they can be very fragile and broken if not mined with much care. The increased value of a diamond is determined by the four C's – carats (size or weight), colour (colour of the stone), clarity (how clear and inclusion free the stone is), cut (how well the stone is cut once polished). Currently India is one of the centres of diamond cutting where hundreds of thousands of people are employed in the industry, primarily focussing on cutting and polishing Argyle diamonds.

A short video was shown on the history of the formation of our planet, starting at around 5 billion years ago. It included a simulation in 3D of how Earth was affected when struck by an asteroid and the time span as it spread across the planet's surface. We also heard about the formation of the tectonic plates and how diamonds were created by extreme pressure build up and heat, estimated to reach between 1200C and 1600C. Some diamond pipes can be extremely deep such as those in South Africa. Further discussions explained the formation of life and the time periods where life flourished between large scale extinction events. This was followed by an explanation of how exploration is undertaken for diamonds and what parts of the earth are most prospective.

There were a number of questions raised at the end of the presentation over various aspects of the mining operations in the Kimberley and future prospects.

Susan Clarkson