

The Whittle Story

A Live Book

Jeff's Newmont phase

By John Robinson, November 2018

My involvement with Jeff commenced around 1983, when I came into Newmont's Melbourne office to manage general project development. I had joined Newmont in 1980 to manage the Taronga tin project through to a feasibility study stage. During this time, I was resident in Glen Innes, a town on the Northern Tablelands of New South Wales and although I had cause to visit the Melbourne office on a regular basis, I had no direct involvement with Jeff during that time. A rapidly declining tin price during the latter stages of the Taronga study, rendered the project uneconomic and thus I came to Melbourne.

By way of background, the company Jeff and I initially worked for was Newmont Holdings Pty Limited, a wholly owned subsidiary of Newmont Mining Corporation of the USA. Newmont Holdings floated as an Australian listed entity called Newmont Australia in 1987 and some years later in 1990, having merged with BHP's gold interests, it became the current Newcrest Mining Limited. In 1983 Newmont's only source of income was the Telfer gold mine, located in the Great Sandy Desert of Western Australia. The mine was developed in the mid-1970s as a joint venture with BHP and still contributes to Newcrest production in 2018. Despite its significance as a major gold source in 1983, Newmont was mindful of the economic vulnerability of depending on a single mine for its financial wellbeing and my role on coming into Melbourne office was to look for possible acquisitions to broaden the company's revenue base.

During this time, the company was also spending substantial resources on exploration both within Australia and the Pacific Rim. Among the various prospects was a gold discovery just outside Kalgoorlie in Western Australia and by 1984 exploration drilling at this prospect had outlined sufficient gold mineralisation to warrant a Preliminary Feasibility Study and this became my responsibility. It was usual practice to assemble a project team to assist in progressing Feasibility Studies and it was at this point that Jeff and Chris Alford joined the project team. Jeff and Chris had been progressively developing the Company's use of computer software at a time when orebody modelling was still clinging on to time honoured manual techniques. In the late 1970s early 1980s it was still common to see geologists and mining engineers constructing three dimensional models using Perspex sheets mounted in a frame with hand-drawn mineral outlines, updated as new drilling data came to hand.

Happily, by the time of the Kalgoorlie Feasibility Study, digitised data was being routinely used to create cross sections and plans of the mineralisation. Once geophysical data had been processed and pit slope geometry established, data manipulation progressed to construction of a block model with intent to apply the Lerchs-Grossmann algorithm. Semi-variogram analysis was used to account for orebody anisotropy and the determination of grade value search distance. Block Kriging followed to assign grade as an essential component to the overall allocation of block values. Jeff was a key contributor to this data processing and manipulation, and I was being gradually persuaded by the apparent magic whilst retaining a reserve of scepticism. It was around this time that Jeff began suggesting that there was a better way to interact with the block model to optimise pit design and thus maximise profit for any given set of inputs.

I was happy for Jeff to use the study pit as a guinea pig, but I wanted to develop a pit outline using processes that I could understand and dare I say, trust. Over the next week I played with the block model, moving the nominal pit base up and down reaching the point where the incremental stripping ratio equated with the marginal ratio for a given set of "Base case" values. Iterative processes are tedious by their very nature and this was no exception. I knew that Jeff was applying his new algorithm to the data in parallel with my efforts and this added to the pressure to deliver. Jeff meanwhile exuded an air of supreme confidence as he weaved his elegant solution to the problem.

I was happy with the fruit of my labours and the resultant open pit mining reserve, as derived from the block inventory within my final pit outline. Shortly thereafter Jeff presented the output from his algorithm despite, having started a day or two after my endeavours had commenced. To my surprise, Jeff had produced a clearly recognisable pit design and in the surprise of the moment the best I could come up with was, "Jeff, that looks like a pit!" It soon became evident that Jeff had generated a pit design with an ore tonnage and grade that was similar to that produced from my laborious iterative process in a fraction of the time. Moreover, Jeff was able to readily produce variations to account for changed input values that would have required several days of iterative labour on my part.

At that time, having a base case pit design with a degree of manual manipulation as a comparator to the output from Jeff's algorithm was a useful validation for its first application. Even at this early stage it was apparent that the speed and flexibility of Jeff's algorithm in generating a family

of pit outlines, each optimised for a range of input sensitivities presented a powerful tool for open pit mine design.

I recall that Jeff had supreme confidence in his logic and the intellectual basis for his algorithm. Jeff's intellect was undoubted, but I regarded his knowledge of mining to be peripheral at best and I needed convincing. I suspect that my reservations were barely tolerable, but apart from the occasional quizzical look they were suffered in silence.

The Kalgoorlie project proceeded through to a "Bankable Feasibility Study" using Jeff's pit optimisation algorithm and became Newmont's second Australian gold mine. It was given the name New Celebration and started as a producing mine in 1986, with the distinction of being the first mining operation initiated with a Whittle 3D pit.

I was pleased to have been there at the start and have watched from the sidelines as the evolution of Whittle software over the last thirty years has progressively made an enormous contribution to international mining.

To read John's bio please scroll to the next page...

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John Robinson BSc (Leeds), MGSsc (Macquarie)

John worked in the Australian mining industry at both an executive and non-executive level for 45 years. John's career spanned roles across the ore treatment spectrum, including plant design, construction and commissioning, as well as non-metallurgical activities, such as ore reserve estimation and mine planning. Companies included, Consolidated Goldfields, Queensland Nickel, Western Mining Corporation, Aberfoyle, Newmont and finally Ashton Mining with 8 years as their CEO.

It was during John's time at Newmont Australia in the mid-1980s that Jeff developed the initial pit optimisation software that was first applied to the design of Newmont's New Celebration pit near Kalgoorlie in Western Australia.