Journal Comment

Mine Safety with Heritage Security

"Tug on anything in nature and you will find it connected to everything else"
John Muir

In this issue there is much for the pragmatist and a great deal for the philosopher. With this Journal Comment, I start my 62nd year of association with mining and metallurgy. The quotation reflects my experience. I have rubbed shoulders with every element in the periodic table, from hydrogen, via the platinum group metals to uranium, from pragmatism to philosophies on job creation. And so it is in this issue.

On the pragmatic aspects is a set of two papers by Dr Joughin and a team of consultant co-authors including those from SRK, all of whom are long-time campaigners in assembling mathematical models expressing the probability of an accident in relation to practicality and profits of a mining operation. They have chosen the underground platinum mines of the Bushveld Complex to work on. This is undoubtedly the most difficult and complex mining challenge in South Africa.

In the second part they come to a conclusion that there is potentially a lot of practical value in this approach, but a wider pool of data is needed to quantify adequately the statistical variability of the rock strata. Collection and interpretation of more data is well justified.

There are many other papers describing new products and practices to contend with the rockfall problems, to the extent that old coal mines are being revisited and reopened to extract more coal from the pillars left behind after previous mining operations ceased.

There is a paper from China describing the development of automated machines to undertake the mining of underground coal: perhaps a portent of what might be available for our ultra-deep gold mines.

On open pit coal mining, attention is focussed on the handling of the water and the acid mine drainage problem. For example, there is a paper from Czechoslovakia, where the AMD problem brought about the closure of the mine.

In a detailed paper from the Optimum Colliery, an incredibly complex water problem is revealed. In a remarkably detailed water management protocol the mine had to resort to a reverse osmosis plant to produce saleable domestic water to achieve a complex but working environmentally acceptable system.

In a similar paper from a BHP Billiton Group coal mine, also at Middelburg, by Z. Nzimande and H. Chalke, a comprehensive commitment is made to restoration of the environment after mining is complete and to the other requirements of the Mining Charter. Of particular significance is a key statement in the paper:

"We will ensure that we take action within our own businesses and work with the governments, industry, and other stakeholders to address the challenge of climate change."

On an extensively legal and political basis is the paper by Andrew Mitchell et al. entitled ‘The Avatar Syndrome,’ in which the sanctity of previous tribal and general hereditary rights to land and mineral resources has been enshrined in law. It is clear that the provision of future livelihoods and sustainability guarantees is rated of high importance in the Mining Charter.

On these political and philosophical aspects I should not make comment. But I feel I can point out some promising developments likely to lead to income generating opportunities after mine closure and at the same time alleviating the global warming problem.

I refer to two dramatic announcements on non-polluting energy systems that were made at the World COP17 global warming conference held in Durban, South Africa in December.

The one was a demonstration by Professor Diane Hildebrandt of Wits and Jaco van der Walt of SANEC/NEFCOR of a pilot plant that converted biomass in the form of plant and waste organic material (including domestic sewage sludge) to diesel biofuels. This process, named the ‘Beau-Ti-Fuel’ process, was based on pyrolysis in a high-temperature plasma arc to form ‘syngas’ (carbon monoxide and hydrogen), followed by a Fisher Tropsch synthesis to diesel fuel. The process and plants were claimed to be ideal for smaller applications such as in clusters of villages of small-lot farmers.

With the limited data made available it is impossible to compare this process with the conventional anaerobic digestion production of methane, also now being used commercially as a diesel fuel in office buildings. In terms of the refractory components of biomass, it seems likely to be competitive with other proposed technologies. And there is a good probability of extensive application. One can visualize mines forming cluster communities supplying their requirements of diesel fuel. This from biomass produced on rehabilitated and reconstituted land with treated effluent water ... it is certainly a concept well worth-while pursuing further because this would be self-sustaining and could create many jobs and other community benefits.

The second was a dramatic top-level presentation by Cynthia Carol, CEO of Anglo American, announcing a commitment to promote the further development of the platinum fuel cell as a dominant energy source for world use, ultimately to replace fossil fuels.

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This edition of the Journal again covers a wide range of subjects related to underground mining. Safety features strongly, with topics covering the spectrum from the helicopter view of the probability-based likelihood of successful outcomes of the systems to the detailed design of rock support elements. Accident prevention utilizing advanced technology receives attention, as does the design and implementation of mining methods. The environment is not ignored either.

It is interesting to note where the papers come from. Three have their origins at universities, the traditional suppliers of research. All are from non-South African universities. While this indicates perhaps a lack of mining research being done at South African universities, it also highlights the ability of the Institute to attract contributions to knowledge from other parts of the globe, to the benefit of not only our own industry, but everywhere in the world where the Journal is read.

Another four papers are directly from practitioners employed in our mining companies, indicating that knowledge is not only generated but new procedures are also implemented in practice, highlighting the developmental aspect of research and development. The balance of the papers are from consultants and suppliers, all contributing to the public domain of mining knowledge.

The point I want to make here is that mining research in South Africa is not completely dormant, but that it is being done in several different places. It is good that development is still taking place, but looking at the long term, we do not have the coordinated effort and a long-term plan that we need. The situation is not yet completely hopeless, but we certainly do need a more coordinated effort as well as more fundamental research than we have at present. Without the generation of new knowledge at the fundamental level, we will run out of foundations on which to develop new processes and procedures for implementation.

Turning now to the Institute and the little bit that is left of the year, the major upcoming event is the annual banquet. The banquet per se is not mentioned anywhere in our constitution, yet it is our most important event from several perspectives. As the Institute we provide a platform for communication and the banquet does exactly that in a direct fashion. It is the event every year where we can talk directly to friends we have not seen in a while and meet new ones.

There is also a component of tradition in the proceedings. It starts off formally, reflecting the prestigious and professional nature of the Institute, but as the evening wears on, it becomes less and less formal and towards the end there are few differences between this event and a pub get-together. The most important difference is probably the composition of the body of participants, consisting of professors, decision-makers and implementers, and advisors from all parts of the country and from all conceivable disciplines in mining. I certainly hope that as many as possible of us will again meet old friends and make new ones at the event. In addition to everything else, the banquet is simply an occasion to enjoy, have fun, and celebrate our industry.

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