

***'GM will be leaner and meaner' Barack Obama, President of the USA Comments on the General Motors bailout 2009***

We are emerging, I hope, from the most traumatic recession for many an era . The phrase in the quotation must have been used countless times as the only recipe for salvation. It was commonplace for most of the last century and I was unable to pinpoint the originator, but I suspect it was someone from Harvard, the oldest university in the USA. To illustrate its persistence, I have chosen the most prominent and most recent user of the quotation.

Some 30 or 40 years ago when my career was focused on R&D, I was all too often confronted by this phrase.

'Leaner' to the accountants and business management consultants, was not related to the obesity of the top management but to the reduction of input costs without affecting production. This invariably meant reducing the research staff, the only item in the fixed cost budget that had no immediate impact on profits.

'Meaner' bore no relation to the integrity component of the mission statement of the company but was unobtrusively implemented by price increases to all customers. In the tariff protected business climate and with a bit of collusion with local competitors, this could also be done without significant market volume losses.

We live in a different world today. As part of a global free market culture, with many pressures from environmental considerations, a new recipe is needed for sustainable survival. I have chosen the key words 'keener and cleaner'.

'Keener' refers to a determination to be sharp in technical sophistication, initiative and efficiency, and product quality for the customer. R&D staff and access to other new technologies are vital for this function.

'Cleaner' refers to a 'zero waste' ethic with minimal pollutants, environmental impacts and carbon footprints.

This recipe applied to the bigger global companies requires a wide technical competence and awareness of new developments in the specific field of activity. A portfolio approach to R&D is essential and this should be extended to an interaction nationally.

There is a diverse selection of eight papers in this issue, with a touch of international flavour from China and Iran. All of them represent steps forward in advancing technology. None is an earth shattering new discovery but they are a portfolio of topics that illustrate the keener and cleaner recipe with a good probability of moving forward out of the recession. Let me point to some of the features that invoked such perceptions.

The hydrocyclone has become a workhorse in many aspects of mineral dressing. It is a temperamental animal and minor changes in slurry density, viscosity, pressure and mineral composition have a profound impact on performance. There have been many attempts to obtain

a mathematical model so that a degree of automatic control could be adopted. The development of a model using artificial neural networks looks promising and it may well bring an improvement in achieving optimum economics in handling widely varying feed materials.

Similarly, the work on the simulation of the stirred tank reactor will have a widespread interest in many aspects of hydrometallurgy and not the least in the carbon-in-pulp reactors in our gold mines. These are among the largest CIP systems in the world with profound implications for the abrasion of the carbon absorbents and a corresponding gold loss. The paper may have a shorter-term impact if resin-in-pulp technology takes off, particularly in effluent slurry treatment.

Quantity surveying on all mineral deposits is a statistically difficult but essential component of mineral economics and profitability. If there are any differences between the land surveyor and the mine surveyors in their professional standards, these should be sorted out. The paper on this matter is certainly going to cause much discussion.

The paper on plan compliance for underground coal mines is another example where it is economically vital to have accurate data on mine performance in relation to strategic targets. Computer protocols to ensure this will, I imagine, be well received by the beancounters.

The two papers from the Nuclear Energy Corporation are breaking new ground with the production of nano sized particles of TiO<sub>2</sub> pigments and other oxides such as silica and alumina which play a role in highly specialized materials and markets. The opportunities in the pigment markets are certainly an area where South African industry should take its full share. There is probably a marketing niche of ultra high quality products, where the electric power costs and its footprint are well justified in comparison with the standard chemical processes. This could be a specialized activity for a much needed cluster industry for Richards Bay where electric power, its cost and footprint, are of particular importance.

This brings me to what I found to be the two most interesting topics to illustrate the keener and cleaner recipe.

A top-level technical paper from China is always intriguing. This one on coal upgrading in a fluidized bed of magnetite is particularly interesting as it is a novel concept to me and is also devoted to the avoidance of wasting large quantities of water needed for the standard method of coal washing. I gather that, in certain areas of China, water is as precious as in South Africa and there is special attention to 'dry' methods of mineral separation. This fluidized bed method appears to be highly effective in reducing the ash content of a typical coal from

South Africa. As you know, I, in common with most commentators in this country, have an obsession about conserving water, not only to fulfill the constitutional rights to provide domestic water to all households, but even more so when every mega litre that can be used for agriculture is the catalyst for job creation.

Of even greater interest is the remaining paper on the fluidized bed combustion of waste coal fines for the production of syngas for, integrated gasification combined cycle (IGCC) for power

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generation. IGCC is claimed as the technology for the 21st century. My instinct says to me that it is the technology that we need for tomorrow. It is particularly relevant to the northern KwaZulu-Natal area around Richards Bay, to the electrometallurgical areas of Mpumalanga, and even extending to Mozambique. This is for two reasons: the first is that the conversion efficiency to electric power is significantly better (>50%) than the conventional (35%). The cost is significantly less since there are billions of tons of waste coal in these areas, which can be supplied at almost negligible cost. The impact of steadily removing an environmental nightmare, and at the same time maintaining our competitive position in global markets, is profoundly attractive.

The second reason is relevant to the zero waste culture that is a component of the keener and cleaner culture. The waste coal contains 40% ash, or more, of which the main constituents are generally aluminium and silica. High on my portfolio list, with a favourable success probability, is the production of cell grade alumina and/or a cement product similar to the 'slagment' pioneered previously in South Africa. This opportunity conforms exactly to the keener and cleaner injunction.