

Journal Comment

Paste and Thickened Tailings

The November edition of the *Journal* contains papers that were presented at Paste 2012, the 15th International Seminar on Paste and Thickened Tailings that was held in the Pilanesberg during April this year.

I am sure that every reader has heard the joke about the argument between the various organs of the body as to which would be crowned as the 'King'. The brain, heart, and lungs all made their respective impressive cases. Then an unmentionable organ quietly announced its claim to the title, to be greeted with laughter and derision. So it refused to allow any solids to pass through and the body started sweating as the toxins rapidly accumulated in the blood, resulting in total capitulation by the pretenders to the throne – and guess which understated organ was anointed King?

Is such bathroom humour out of place in a scientific journal? Well, Yes, if it is gratuitous humour, but, No, if it serves to highlight a point that might not be self-evident. The linking of the joke to the business of mining should (I hope) be obvious, and I am using it to highlight the immense importance of solids thickening as a unit operation that goes on with its business so quietly that it tends to be ignored – until something goes wrong.

Need we be reminded of the night of 22 February 1994 when a tailings dam failed and flooded the suburb of Merriespruit, Virginia, resulting in the tragic deaths of seventeen people? The collapse of the wall of the tailings dam was precipitated by a thunderstorm in the late afternoon that flooded the penstock, but a deeper underlying cause (but not the only cause) was attributed to the placement of slurry, over many years, with a low relative density that led to ongoing seepage and sloughing of the northern wall. There is no need to dwell upon the outcome of the enquiry that followed, except to mention that the importance of understanding the factors and forces that determine the stability of tailings dams would never be underestimated again.

It is unfortunate that for a large percentage of the world's population their only view of mining happens to be the highly visible tailings dams, and dam failure happens to be all too common. Just Google 'tailings dam failure' and scan some of the hits – it's not a happy picture at all. There is scarcely a mining country in the world that has not experienced a catastrophic failure that resulted in multiple deaths. Should we be surprised when environmental groups use these incidents to lobby for the banning of all mining? (How the world will live without mining is another matter entirely!)

And so let us now move away from this negativity to the positive contributions contained in the eight papers on

paste and thickened tailings. The opening remarks made by Fourie (University of Western Australia) in his paper succinctly places the topic into perspective: 'Interest in the potential use of high-density, thickened tailings has recently increased significantly. Reasons for considering this new technology vary across projects, but commonly include the need to conserve water, perceived lower risk of catastrophic failure, potential easier closure, or even reduced overall costs'. That pushes all the right buttons for me!

Jewell (also UWA) adds that 'One of the advantages that can be obtained from thickening tailings prior to discharge is that the tailings can be stacked at a steeper beach angle than is obtainable with conventional low-density slurries'. But he then goes on to state that 'However, there is at present no universally accepted method available for the accurate prediction of tailings beach slopes'. I guess that the key word in that somewhat downbeat statement is accurate.

The physical and chemical factors involved in the stability of beach slopes are varied and complex, and the way in which these factors interact and affect each other will require years of continued research. On reading the papers, the impression gained is that those involved are just beginning to understand the enormity of their chosen research field.

As we are forced to use empirical models in the design of tailing dams, the importance of continuous measurements of feed relative density, tonnage and volume, decant and drain flow volumes, water content profiles along each beach, particle size distributions at the surface and down the full length of the beaches, has been described in the paper by a research team from the University of the Witwatersrand, Anglo American, and Fraser Alexander Tailings. The mismatch between the predicted values of key experimental parameters and actual measured values is one of the primary tools used to refine our understanding of complex systems.

I have not cited every paper in the November issue of the *Journal*, and I trust that none of the authors will take offence. And then, how would I like it if someone linked my lifelong field of research to an unmentionable organ in the body? Personally, I would fall over laughing, but I hope that the serious content of my Comment does full justice to the quality research that is contained in these papers. ♦

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