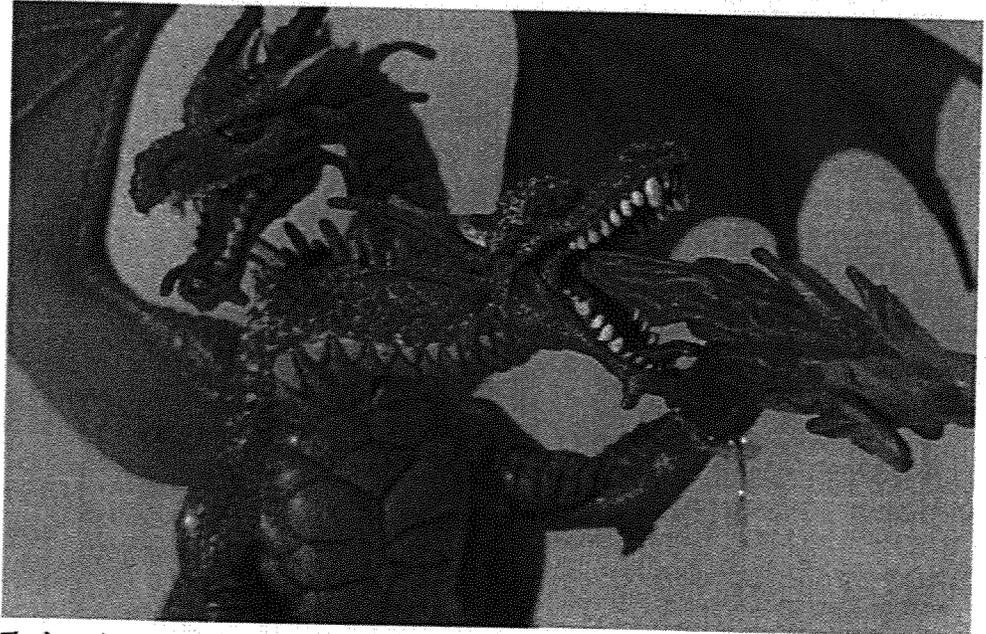


Tailings: dammed, damned or damless



Tailings dams are long-term hazards, and must remain stable in the landscape long after we are no longer there to monitor and maintain them writes Andy Robertson.



The dragon's message is becoming increasingly clear – 'become damless or get out of dodge – and no, you cannot have our water either'. Photo by Andy Robertson

Dammed tailings

The largest mines have increased their production, tons milled per day, by an order of magnitude every 30 years, for the past 120 years. In the late 1800s the largest mines milled a few 100s of tons of ore per day. Today our largest mines mill a few 100,000s of tons per day. Quantities of tailings have grown in proportion, and to store them our largest tailings dams have had to increase in volume from a few millions of tons capacity to several billions. Areas occupied by individual dams have increased from a few hectares to many square kilometres. Maximum dam heights have increased from less than 20 m to approaching 300 m – giants on the landscape.

Damned tailings

In constructing these tailings dams we are no longer merely doing earthworks – we are terraforming, or changing the face of the earth with gargantuan structures that will remain on our landscape in perpetuity. These huge structures store vast quantities of water and liquefiable solids that could flow if the dams breach. They are long-term hazards, and must remain stable in the landscape long after we are no longer there to monitor and maintain them. In the view of the downstream

communities, we are not terraformers, but terror fermenters. And to add insult to potential injury, we steal their water and pollute their environment. In metaphorical terms 'we have tickled the dragon' of society. The dragon is waking and is becoming hostile to the threats we pose. Our tailings dams are increasingly 'damned' and our water usage and seepage abhorred.

Damless tailings

The dragon's message is becoming increasingly clear – 'become damless or get out of dodge – and no, you cannot have our water either'.

Lessons in damlessness

Our weapons for survival are filtered paste and thickened tailings, as well as mechanically and hydraulically stacked tailings – all technologies that may offer opportunities to eliminate or reduce the sizes of containment dams, reduce water

use and seepage and produce dry, stable landforms at closure. From 16–19 June 2013, our specialists, and those seeking specialists in these defensive technologies, will meet at Paste 2013 in Belo Horizonte, in the State of Minas Gerais, Brazil, to share knowledge and experience to better address tailings disposal with reductions in the need for dams and minimisation of water usage.

The state of mines (and tailings)

The seminar setting is unique, in Belo Horizonte, the capital city of a state named 'General Mines' (Minas Gerais or MG) with a history of extensive mining that dates back to the late 1600s. In the early 1700s, nearby Ouro Preto was the capital of the state, the centre of a gold rush to the 'Eldorado' of the Portuguese Empire and a flourishing city with churches painted by the leading religious painters from Europe. Since then, the state capital has moved on to Belo

Horizonte; while Ouro Preto has remained, with the period architecture, complete with the churches of the early 1700s, a rich mining culture and the leading mining university in Brazil. A UNESCO primary heritage site, Ouro Preto is one of the best preserved monuments to the economic and cultural benefits of mining. Ouro Preto is a three hour drive from Belo Horizonte and is the destination for one of the site tours.

MG is blessed with rich iron ore bearing formations, which have given rise to a large number of open pit iron ore mines. These mines, located mainly in an area named the Iron Ore Quadrilateral, within three hours' drive from Belo Horizonte, have provided the prosperity that makes MG one of the 'have' states of Brazil and a focus for mining and industrial development.

Across the rich minefields of the Iron Ore Quadrilateral, there has developed a patchwork of open pit mines, tailings dams and waste dumps amongst suburbs, towns and villages that share the prosperity derived from mining. Recent intensive development of mines, resulting from the sustained 'super boom' in mined resources, has led to intense competition between mines needing land and water

for mine development and increasingly affluent communities seeking to preserve their natural environment. This has forced mines to develop tailings facilities on less favourable sites, and to adopt technology that minimises impacts and risks to the downstream population, and also to consume and/or contaminate less water. One new methodology is to cyclone split the sand and slimes and then place the sands in hydraulically deposited sand stacks which can be drained and cease to be dams, while containing the slimes in smaller dams or disposing of them in exhausted mine pits. The future of iron ore mining in this region increasingly depends on finding solutions that further develop and adopt dam reduction and water conserving technologies.

The bauxite and aluminum industries of the Brazilian north (Amazonia) produce very fine tailings that settle to high void ratios and occupy large volumes. Filtering of these fine tailings has been found to be remarkably effective, allowing mechanical transport and stacking. There is currently a substantial swing in the industry towards this form of tailings management.

With the advances being made in the various methods of tailings dewatering using thickeners and filters, and the

distribution and placement methods for paste, thickened and filtered tailings, it is only a matter of time before there is more extensive use of these technologies. A substantial number of evaluations have been made or are underway. This interest is likely to intensify.



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Paste 2013

The 16th International Seminar on Paste and Thickened Tailings will be held in Belo Horizonte, Brazil in June 2013. Visit www.paste2013.com or email paste2013@infomine.com for further information.

