

Tailings Beach Slopes Research Project



Co-Sponsors: ATC Williams (previously Australian Tailings Consultants), AngloGold Ashanti, Australian Research Council

Locations: Peak Gold Mine, Cobar, NSW, Australia
Sunrise Dam Gold Mine, WA, Australia

Date: 2002-2007

In 2002, ATC Williams*, with two co-sponsors, initiated a post-graduate research project into the prediction of tailings beach slopes, the first PhD program of its type in the world. After decades of empirical rules, it was considered time to apply science in a structured manner. The research involved two PhD students, based in Iran and Australia respectively.

The project goal was to develop a reliable means of predicting tailings beach slopes formed by the hydraulic discharge of non-segregating thickened tailings slurry.

The research focused on the self-forming channel behaviour of tailings slurry that typically occurs on tailing beaches. Large scale field experiments were conducted with the use of a 10m long flume apparatus to analyse the channel flow of tailings slurry.

The flume was utilised at two mine sites in Australia - Peak Gold Mine in Cobar, New South Wales, and Sunrise Dam Gold Mine in Western Australia.

In addition to the field experiments, a series of small scale laboratory experiments were conducted. These were to analyse the channel flow behaviour of a wider range of non-Newtonian slurries, as well as gathering relevant data from various third parties for further validation of the models.

The project objective was achieved from two separate working fronts, with both PhD students presenting different methods for the prediction of tailings slopes.

One approach involved three new tailings beach slope prediction models, with two of the models being capable of predicting beach slopes for both non-segregating and segregating slurries.

The predictive accuracy of the models was validated against field data compiled from various mine sites operating thickened tailings stacks, and experimental data obtained from various laboratory scale tests.

PhDs were subsequently awarded to both students involved in the project. One thesis was recognised by examiners as “work that is of the highest merit at the forefront internationally in its field, as well as strongly competitive at an international level”.

[Postscript: Both PhD engineers are now employed by ATC Williams.]