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## **MAJOR UWA RESEARCH PROJECT TO BOOST MINE SAFETY**

The Australian Centre for Geomechanics and the School of Civil and Resource Engineering at The University of Western Australia have secured industry sponsorship for a research program on the geomechanics of underground backfilling in mines. The funding has been provided by Barrick Gold of Australia Ltd, BHP Billiton and Sally Malay Mining Ltd.

Backfilling involves the use of materials to fill cavities created by mining to establish and retain safe working conditions and to provide ground support during subsequent mining operations.

The project will focus on the application of effective stress theory to minimise geotechnical risks associated with backfilling procedures and improvements to the backfilling process in order to reduce costs and improve scheduling procedures.

ACG principal- environmental geomechanics Dr Andy Fourie, together with Professor Martin Fahey and PhD candidate Mr Matthew Helinski, began work on the project - An Effective Stress Approach to Mine Backfill – earlier this year.

“The use of backfill in underground mining is increasing due to the need for regional or local support, increased extraction and the environmental benefits that accrue from reduced volumes of tailings stored on the surface,” Dr Fourie said.

“In the past, mine backfill has generally been rockfill or classified tailings-based high density hydraulic fill.

“Recent advancements have made the preparation, transport and placement of full plant tailings possible. This has required that the material be transported at a relatively high solids content to prevent segregation and separation, which has led to the adoption of the term pastefill to describe such backfill.”

Dr Fourie said pastefill was increasingly being used within the mining industry, although there remained a number of impediments to its widespread adoption.

Gaps in the technology of placing fill and mining adjacent to filled stopes (an excavation in the form of steps made by the mining of ore from steeply inclined or vertical veins) meant the geotechnical risks could not be adequately quantified.

“While pastefill overcomes many of the problems associated with previously used fill types, concerns remain regarding a number of issues relating to safety - particularly quantification of loads on barricades, production - maximum safe fill rates - and costs - primarily binder and additives,” Dr Fourie said.

“It is believed that many of the geotechnical risks stem from a lack of understanding of the development of effective stresses within a fine-grained cementing fill mass and can be eliminated or controlled by developing a framework based on effective stress theory.”

Dr Fourie said development of such an understanding would enable issues such as time-dependent barricade loads, strength gain with time and the impact of moisture movement within a filled mass to be quantified for the first time.

He said in order to provide the mining industry with the necessary tools to evaluate the potential viability and minimise risks associated with using a pastefill system, it was essential that fundamental issues of effective stress development within a filled mass be understood.

As part of the research, Postgraduate Studentships in the Field of Mining Backfill are being offered. The positions would suit civil, resource or mining engineering graduates.

Dr Fourie said the research project was in a completely new field within the mining industry and would provide successful candidates with a niche qualification in a rapidly expanding field.

The research program will include collaboration with researchers in Canada and there may be opportunities for exchange visits.

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