

# **Blasting Trials to Control and Monitor Displacement of Narrow Vein Gold Ore**

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## **ABSTRACT**

Low grade surface gold mining at the Acacia Resources, Union Reefs Gold Mine in Australia's Northern Territory, involves the excavation of benches in three slices after blasting. Blast patterns span zones of high and low grade ore, as well as zones of waste, and selective excavation is required in order to maintain economical head grades for the carbon-in-leach processing plant.

Reverse circulation grade control drilling, prior to blasthole drilling, is routinely conducted to establish the location and size of ore blocks. At the Acacia Resources Union Reefs Mine, ore blocks are at times as narrow as 2 metres, and less than 10 metres long. Blasthole patterns are typically as large as 70 metres x 30 metres, and contain many such small ore blocks. Blasts are fired in benches 7.5 metres high and excavated in 3 slices of 3 to 3.5 metre thickness.

Grade control drilling, angled at 55° over a vertical depth of 7.5 metres, has established vertical continuity of the ore blocks at Union Reefs. There are three primary objectives of mining at Union Reefs, all of which must be achieved in order to maintain economic viability:

to control the blasting process so that ore blocks do not become unduly diluted from excessive intermixing with adjacent low grade or waste material;

to track the movement of ore blocks after blasting so that excavators can selectively recover ore blocks with minimal dilution;

maintain an economical level of excavator productivity by use of appropriate blasting parameters.

Site studies and blasting trials have been conducted over a period of approximately 6 months to establish an optimised blasting process, identifying a number of issues impacting on

overall performance. Important issues have included appropriate powder factors (depending on degree of weathering), optimum delay timing and hole sequencing, explosive type and properties, and careful attention to the blasthole loading process. Just as importantly, the mine has developed techniques for measuring the amount and direction of movement of ore blocks, as well as methods to compensate for this movement during excavation. The measurement procedures apply to all three excavation slices, and show that significant movements occur throughout the vertical extent of the muckpile. Movement of the bottom slice is sufficiently different from top slice movement as to justify separate adjustment.