

CASE STUDY

Temporary Island Pillar Recovery in Narrow-Vein Mining Using WebGen™ Technology

Minjar Gold Pajingo Mine, Australia

Site Profile

The Pajingo gold operation is in Queensland, approximately 150km south-west of Townsville. It was discovered by Battle Mountain Gold Company in 1983 and first gold production commenced in 1986 from open pit mines. Since its initial discovery, there has been various ownership changes of Pajingo with Minjar Gold acquiring the operation in August 2016. The Pajingo gold operation has produced more than 2.7 million ounces since 1996 and is forecast to produce between an average of 60,000oz and 65,000oz p.a from 2017-2019.

The Situation

Minjar is in its first phase of mining the limited 63,000-ounce Lynne reserve and is still actively exploring to build the resource and expects a step change up as it enters phase two mining of surrounding ore bodies. They are open to alternate methods of mining needed to sustain viable production volumes.

The normal mining extraction of stoping panels has required island pillars to be left to provide hanging wall support during excavation. Pillar locations are determined geotechnically and at times house gold reserves of >200 oz limiting mine life and recovery. Traditionally the island pillar would remain in place and classified as sterile resource.

The demonstration area of the mine was classified as containing reactive ground from recent routine testing.

Technical Solutions

Recovery of high-grade pillars during the process of mining a stoping panel was seen to be a step towards a solution for the planning of additional reserves.

Minjar Gold identified the use of WebGen™, Orica's wireless initiation system, could be deployed to recover these island pillars, making them a Temporary Island Pillar (TIP). A joint project team was tasked with rationalising and providing feedback on the concept. The team recommended an increase in hole diameter to 89mm. Blast initiation and sequencing was modified to aid the speed of the mining cycle and direction of throw.

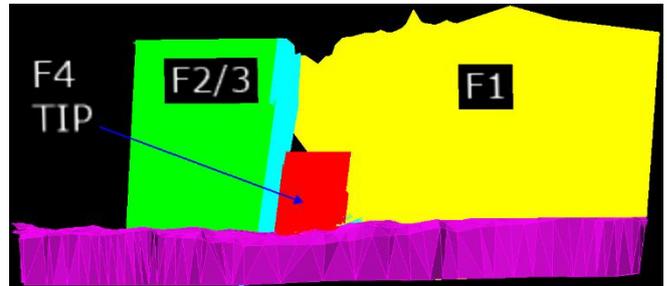


Figure 1: Side view of panel including Temporary Island Pillar

Extensive WebGen™ signal surveys and blast induced pressure measurements were completed in the lead up phase to control risks of communication and misfires. Subtek™ Eclipse™ was used as the bulk product in all firings. This was manufactured and delivered into the up-holes via the customer's Normet mounted Hypercharge™ Drive unit. Up-hole loading expertise and assistance from the Orica Operations team was also provided. The i-kon™ III initiating system was utilised for the first, second and third firings (F1, F2/3). WebGen™ was pre-charged into 6 holes in the TIP for firing four (F4). This was completed during charging of the F2/3 panels, eliminating any exposure which may arise from attempting to access the TIP post-firing of F2/3, see Figure 1

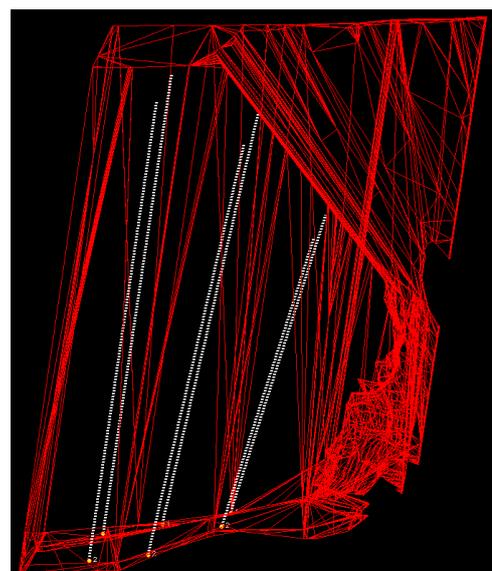


Figure 2: Side view of Temporary Island Pillar showing blast holes



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The Result

All blasts were carried out without incident and achieving recoveries far and above design.

Metric	Unit	Result
Brow Exposure	Time (manhours)	0
Excavation Performance	Increased excavation call on draw point	180%
Draw point hang-up	% of blasts	0
Recovery of Temporary Island Pillar	% Recovered of fired tonnes	400%

The recovery of 400% from the 6-hole TIP firing was well above the customer's expectation and the expected "measure for success" of 50%. The increase of recovered tonnes can be somewhat, but not solely, be attributed to the broken ore sitting on top of the island pillar unrecovered from previous firings.

This material would not have been recovered conventionally if the TIP had not been successfully blasted. Minjar Gold were very happy with the outstanding success. A new pillar recovery technique had been proven that improves their flexibility in mine design and provides the potential to increase attainable mining reserves.

The cost of achieving the extra ounces is low, due to no ore access costs, and so profitability is improved.

Testimonial

"The introduction of island pillars at Pajingo was innovative in itself in the pursuit of better overall recoveries of the resource. The use of WebGen took this a step further by allowing the island pillars themselves to be recovered. The use of WebGen and the charging of the TIP was completed within an hour and could be done well in advance of the effective brow, meaning access to the brow was limited. Somewhat pleasingly, the hanging wall failed behind the island pillar blast (justifying the pillar in the first place). A rapid delay sequence aimed to throw the material to the draw

point away from the open span and subsequent failure worked well."

Jack Carswell

Acknowledgements

Orica wishes to thank the customer for their support and permission to publish this case study.

Jack Carswell, Shane Brown, Aidan Cottle, and Ryan Walker from Minjar Gold. Scott Sheldon, Ben Horsfield, Gil Smith, and Julian Papp from Orica

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Date: August 2020

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