

CASE STUDY

Using 4D™ to reduce powder factor in soft and wet ground

Bloomfield Mine

Site Profile

Bloomfield Mine is an open cut coal mine owned and operated by The Bloomfield Group, in the Hunter Valley, NSW. Bloomfield Mine is near residential and commercial zoned areas of East Maitland. Managing the environmental effects of blasting, including post blast fume, is crucial to maintaining Bloomfield's license to operate (LTO).



Blast pattern EX05_B1_S1 just below the pre-strip zone.

The Situation

Some areas of the Bloomfield mine have relatively soft sedimentary overburden that are well matched to blasting with ANFO when dry. However, when wet ground conditions preclude ANFO use, blasting engineers previously had no choice but to charge ANFO patterns with Fortis™ Coal at a minimum density of 1.15g/cc. This pumped emulsion blend has 44% more energy than ANFO. In soft ground, the excess energy often resulted in fume. The extra mass of explosive per blasthole and higher unit cost of Fortis™ directly increased the unit cost of blasting. A solution was required to productively blast soft, wet ground without increasing the powder factor, and without fume.

Technical Solutions

To meet this challenge, Bloomfield and Orica demonstrated the 4D™ Bulk System for surface mines in this area of the pit. 4D™ offers an expanded range of higher and lower energy bulk explosives for dry, wet and dewatered holes without the hassle of bulking agents and highly-energetic metal additives. 4D™ products are delivered from a 4D™ capable MMU with

a control system that automatically manages the delivery to achieve the specified average relative bulk strength (RBS) for each blasthole. When designing with 4D™, blasting engineers and shotfirers simply select a product based on hole water condition and an energy level. Orica's LOADPlus™ system handles all the calculations and controls the delivery to ensure sensitivity at the toe of the hole and reliable initiation of the column.

The Bloomfield demonstration blast bench height ranged between 6m and 20m. The pattern was designed and loaded with Fortis 4D™ Coal 110 & 130, replacing the standard product Fortis™ Coal 1.15g/cm³ (RBS of 144). The holes were initiated with i-kon III electronic detonators.

The Result

Overall, the 4D™ system reduced the average bulk strength of explosives by 20% and reduced the overall powder factor by 12% compared to conventional pumped emulsion blends. No fume was observed during the demonstration blast and dig rates were no lower than those in conventional blasts.

Testimonial

"We are happy with the performance of 4D™ and it was really important to reduce the energy in soft ground conditions. It had better fume performance compared to traditional products, due to the lower density and energy in soft geology" – Scott Dark, Drill & Blast Supervisor, Bloomfield Group.

Acknowledgements

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Author: Duane Clifford

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