Sun Mining Services

Low Density WALA

Deep hole blasting

Case study - December 2013

Introduction

WALA was proposed to be used at a coal mine in Bowen Basin QLD with the potential to replace Emulsion heavy ANFOs being used for blasting at the time of trial. The average over burden height at IPCM was exceeding 55m. Emulsion Heavy ANFO blends had to be loaded in different decks and separated with air bags and air decks in order eliminate dead pressing due to charge overhead static pressure.

Brief Description

Heavy blends of WALA (50/50) were augered in 68m deep blast holes with the cup density of 0.4 g/cc at IPCM in single deck. In comparison Emulsion heavy ANFO blends were loaded in 3 separate decks to eliminate dead pressing of the charge at the toe. The holes loaded with WALA required only 2900 kg to achieve 8 meters of stem height. In comparison, 3900 kg of Emulsion heavy ANFO was loaded to achieve 11 meters of stem height. The section loaded with WALA outperformed the other section by improving the cast ratio by 15%. There was no observable fume event. WALA fully detonated and there was no sign of toe issue/charge after the over burden was removed.

Detail description

The overburden comprised of soft clay transitioning into competent sandstone with some moisture in the clay. Previous blast conducted on similar bench using augered Emulsion heavy ANFO (40/60 and gassed 50/50) generated poor quality blasting at the toe and un-initiated columns of product at the bottom of the blast hole. In order to eliminate the problem, 3 decks of charge were considered to be loaded into blast holes. 10 meters of gassed 50/50 Emulsion heavy ANFO blend was loaded at the bottom deck and separated from the rest of the column using gas bag and air deck (2.0 meters). Emulsion Heavy ANFO blend of 40/60 was then loaded into the second deck and separated from the top deck in the same manner as the bottom deck. The top deck was loaded with ANFO. 4 meters of air deck was incorporated into the top charge and then a gas bag was inserted on top. 7 meters of stemming material was poured over the gas bag. In total, 3900 kg of charge was loaded in each blast hole.

WALA 50/50 was selected as the product of the choice for this trial. 2900 kg of WALA 50/50 heavy blend was loaded into blast holes in single deck. The final cup density was 0.4 g/cc. the initial charge height was 40 meters and the product rose by 20 meters to achieve final density. For the trial purpose, one third of the shot was loaded with WALA 50/50 at 0.4 g/cc density and the remaining was loaded with Emulsion Heavy ANFO blends. The shot was of cast blast type and the section loaded with WALA threw the overburden further by as much as 15% comparing to the rest of the shot.

Conclusion

. WALA demonstrated excellent resilient to overhead static pressure.

. Lower powder factor can be achieved using WALA in very deep holes comparing to Emulsion heavy blends. WALA can be loaded at densities as low as 0.4 g/cc.

. Lower powder factor in the section loaded with WALA achieved better cast ratio than area loaded with higher powder factor Emulsion heavy ANFOs.

. The saving associated with the elimination of air bags and air decks as well as less charge per hole helped reduce the overall blasting cost by up to 30%.

. Better distribution of energy throughout the column (uniform distribution) helped to deliver improved casting performance.

. Shallower stem height was achieved using WALA (3.0m less) comparing to Emulsion heavy blend thanks to the lower density WALA adjacent to the stemming material. This resulted in better cast (more uniform distribution of energy throughout the column).

. WALA proved to be the ideal explosive choice for the mine.

. Lower VOD of WALA delivered better blasting performance in comparison with higher VOD Emulsion blends.