COAL ASSETS
AUSTRALIA
GLENCORE

Controlling Blast Related Fume with Modified Explosives

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Hanwha

Background

- Glencore proactively seeking alternatives to lower the risk of blast generated fume
- As with many sites, Clermont Coal Mine has weathered tertiary material that has a high risk of fume
- Increase in industry focus on fume from blasting
- Conventional Bulk Products impose restrictions to reduce risk of fume
- This in turn impacts on downstream processes

Recap on blast generated fume

- Caused by fuel deficiency or low order detonation
- Can be caused by individual or multiple factors:
  - Explosive formulation & quality control
  - Geology
  - Blast Design
  - Product selection & Implementation

In certain conditions, blast fume could cause minor visual impact through to serious health issues and negative media

Blast Fume

FALLOUT: The sky above Mount Arthur Mine near Muswellbrook turns a bright orange due to the toxic fu

AIR QUALITY: The plume of dust created by a mine blast at MTW last Wednesday near Putty Road.

NOTE: These articles and Facebook posts do NOT refer to Clermont Coal Mine

Clermont Coal Mine approach

- **Blasts are managed to reduce both the risk and possible impacts**
- **Key considerations:**
  - **Blast design & Product selection**
  - **Geology & Ground conditions**
  - **Blast Implementation and Changes**
  - **Preceding & Prevailing weather conditions**
- **Possible impacts considered before blast fired with "worst case" scenario adopted**

Clermont Coal Mine approach

Hanwha

Fume Management Zone

Admin

Workshop

Camp

Blast areas

Equipment Clearance

Personnel Clearance

GLENCORE

Trial Objectives

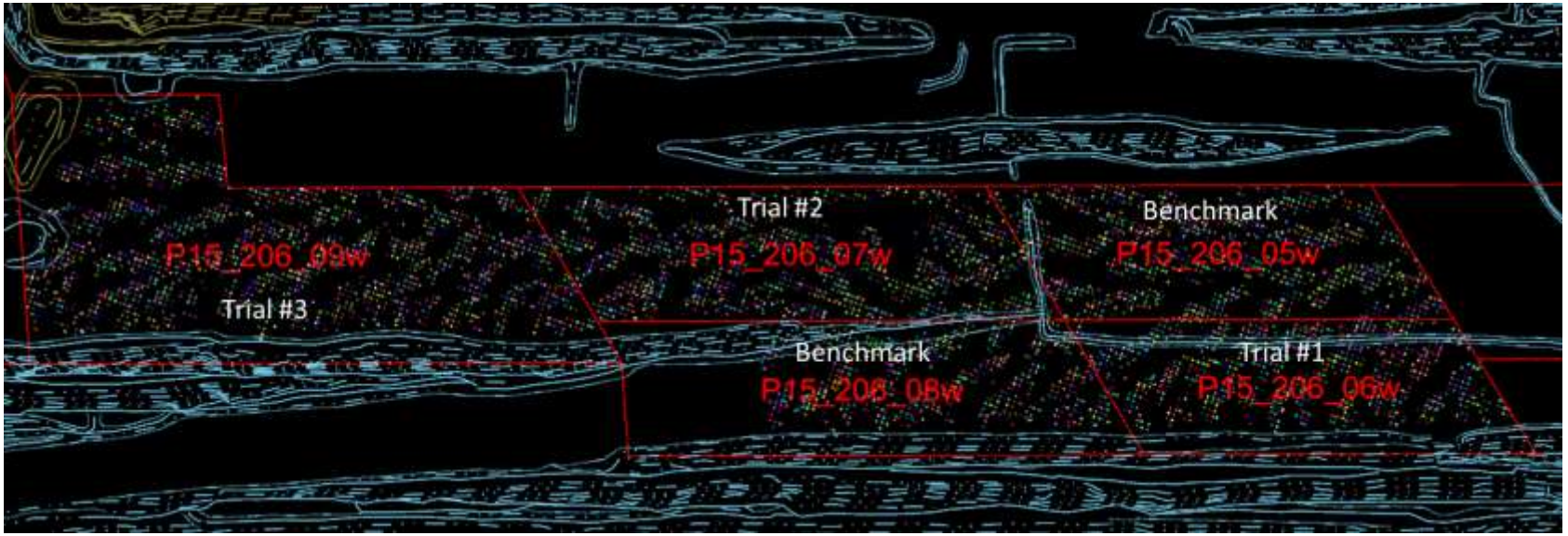
- Absence of any NOx fume
- Zero incidents
- Fragmentation & Heave Profile suitable for excavating equipment
- Excavator productivity to match or exceed benchmark
- Equivalent blasting cost ($/bcm)

Trial Product - XLOAD

- A blend of emulsion, ANFO and polystyrene beads
- Emulsion is a high density, low water content dual salt emulsion (1.48g/cc)
- Emulsion provides high water-resistance
- Polystyrene provides ability to alter product density without chemical gassing
- Density range 0.9 to 1.2 g/cc

Trial Process

- 5 Blasts in total; 2 benchmark blasts & 3 trial blasts
- Alternate blasts to ensure unbiased comparison
- Total product trial of 600 tonnes



Trial Process

- Both benchmark blasts used the standard site blast design parameters & products
- 1st Trial Blast adopted conservative approach:

  - 10% reduction in powder factor
- 2nd Trial Blast same pattern as Benchmark:

  - 20% reduction in powder factor
- 3rd Trial Blast further reduction in powder factor to provide cost neutral comparison

Benchmark Results

1st Benchmark blast

- Loaded with 40% emulsion heavy ANFO
- Slept for up maximum of 48 hours
- Level 1 fume event observed

2nd Benchmark blast

- Loaded with gassed 70% emulsion blend
- Slept for 5 days
- Level 1 fume event observed

Trial Results

All trial blasts loaded with XLOAD at density of 1.0 g/cc

1st Trial blast

- Slept for up to 3 days

2nd Trial blast

- Slept for 16 days

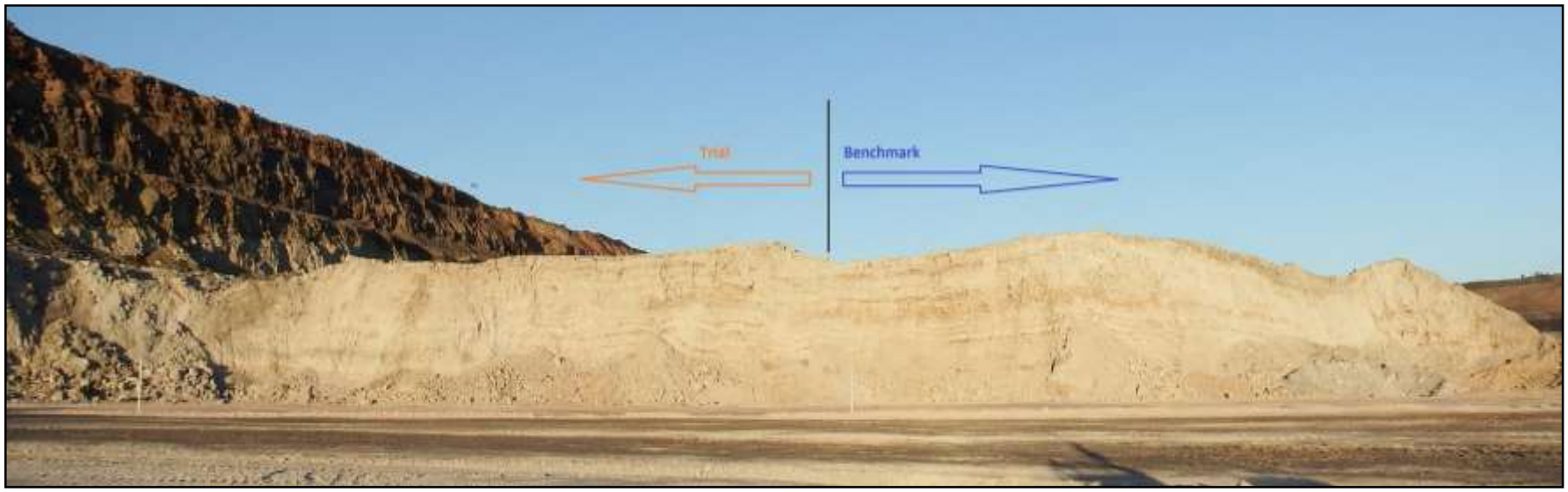
3rd Trial blast

- Slept for up to 5 days

NO Fume observed for any trial blasts

Results

- Dig face comparison between Trial product and benchmark product

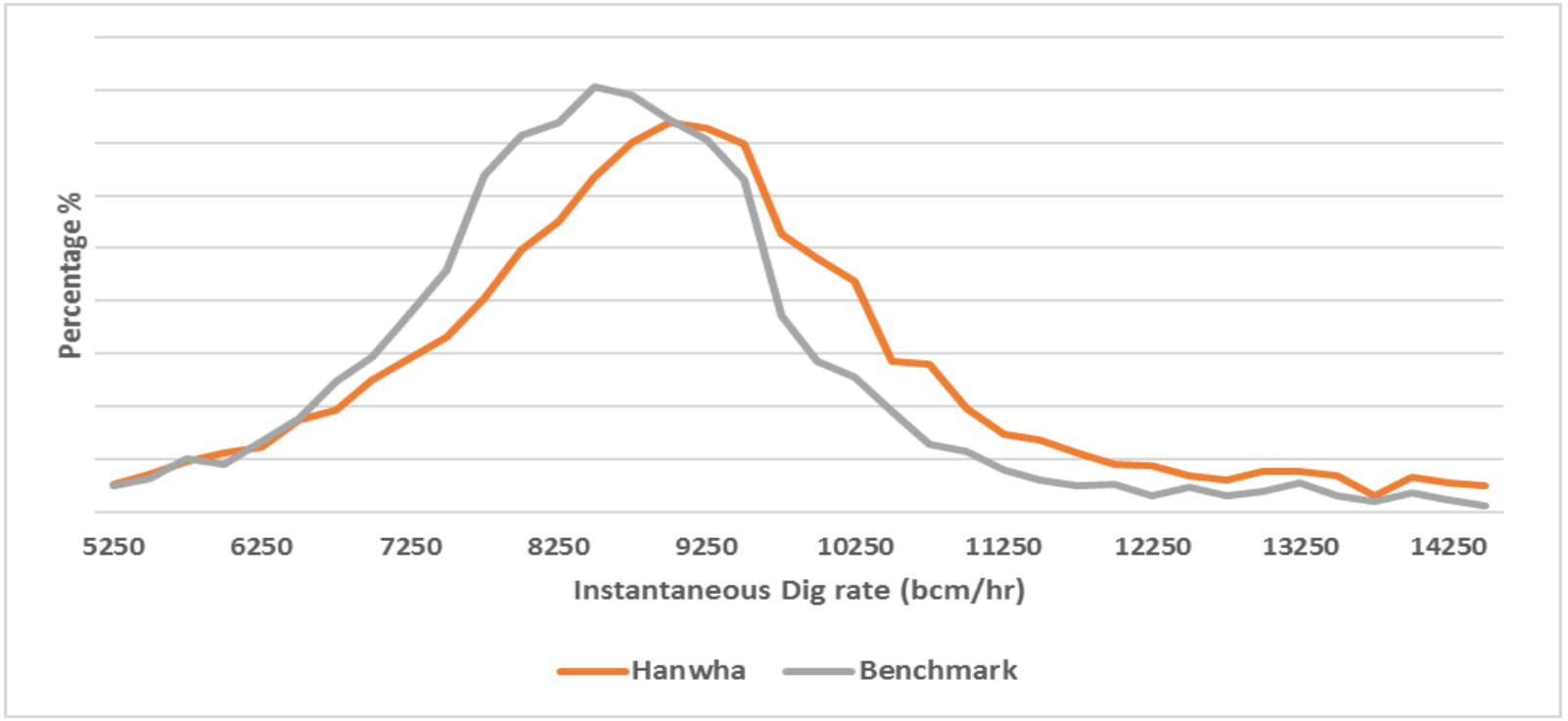


Results

- Instantaneous Dig Rates:

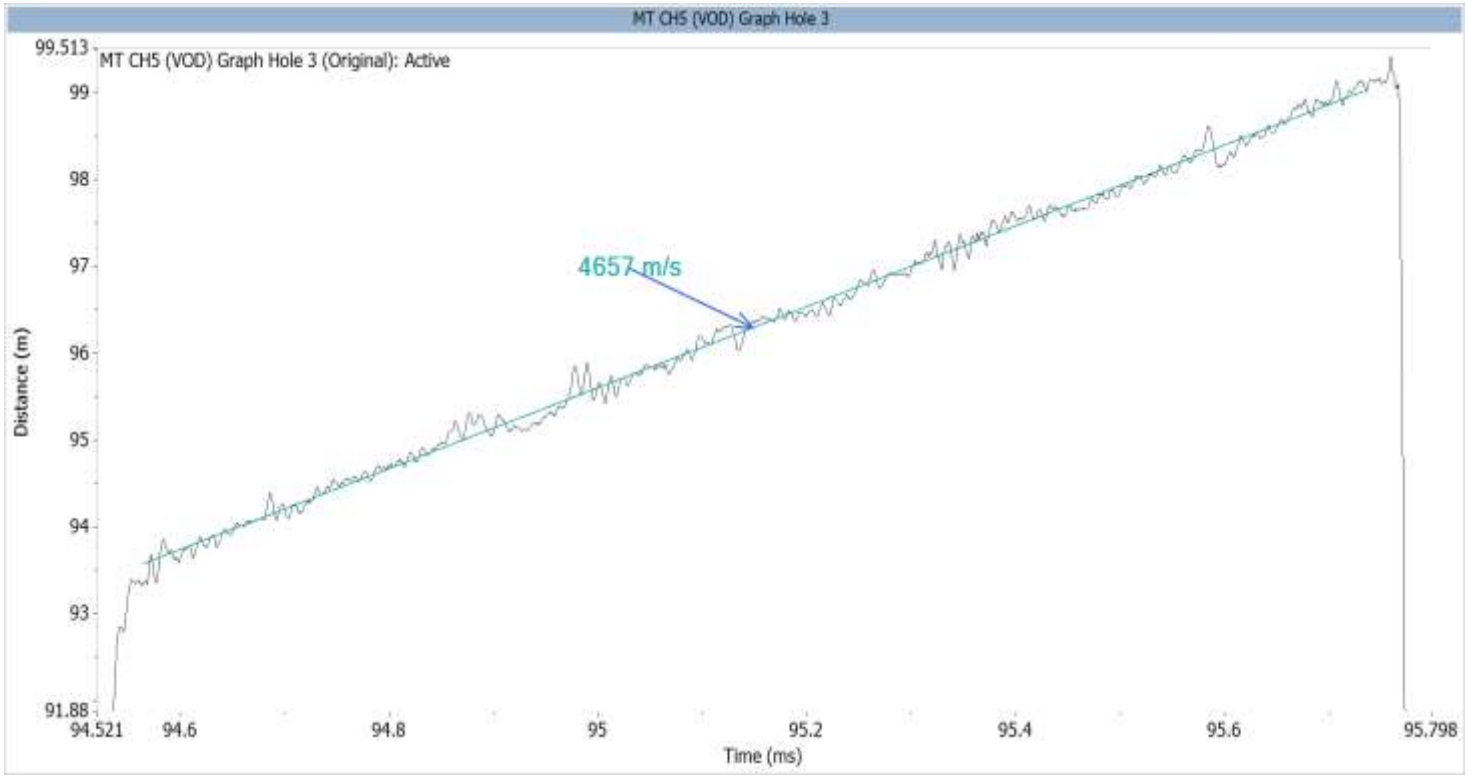
Benchmark Blasts Vs Trial blasts

(6% improvement in dig rate)



Analysis

Velocity of Detonation – XLOAD 100



Conclusion

- No fume observed from the three trial blasts
- 6 % increase in productivity from shovel for trial blasts over benchmark blasts
- No operational or environmental incidents
- Cost neutral against benchmark product

With Thanks To

The Management of Glencore and Clermont Coal Mine

The Management of Hanwha Mining Services

The Operational personnel from both Clermont Coal Mine and Hanwha – in particular the site Drill & Blast Team

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