Outburst Workshop

A new operator's perspective

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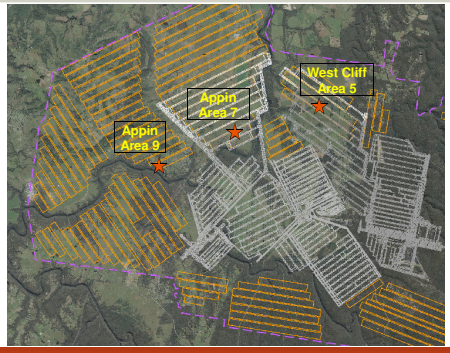
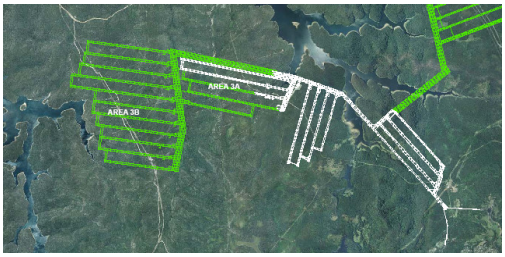
resourcing the future

Illawarra Coal – Bulli Seam Workings & Longwall Layout



Illawarra Coal – Wongawilli Seam Plans & Workings

Dendrobium Mine



Key Threshold Limit Value (TLV) Areas

- Boggy zone
- Low permeability – increasing CO^2
- Dykes & Faults
- Low permeability CH^4 zones
- Limited drainage window areas

Recent experience – Remote mining

- Boggy Zone MG703 & MG704
  - >200 m width
  - Gas content unknown m^3/tonne, >90% methane
  - Remote mining
  - 3 outburst events in MG703
  - Unable to drill into zone
  - 1 sample, post outburst, from lump coal off tail of miner ~$9m^3$/tonne
  - Mined from both sides in MG703
  - Currently mining from one side in MG704
  - Achieved a few in-seam holes across the zone
  - 200+m mined to date; No outburst events
- Low permeability zone inbye end TG705
  - 1 entry, 1 pillar, heavily drilled, not below limits
  - Some localised distortion of cleat structure
  - Remote mined
  - No outburst events

Remote mining impacts

- 1/3 normal productivity
  - Reduces longwall float time – impacts preparation & increases interaction
  - Additional cost per metre
- Low interest work – stop & start, work & wait
- Increased management resources
- Crosses critical zones safely
- Used where necessary

Impacts before remote mining

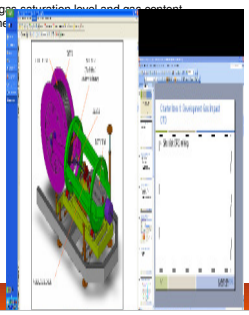
- High intensity in-seam drilling
  - Equipment moves & interactions
  - Drill hole intersections
  - Reduced extraction system performance
  - Diverted in-seam drilling resources

How to improve

- Better drainage
- More efficient remote mining
- Better understanding of the appropriate limits for the various conditions

Better drainage

- Lead time
  - Surface To In-Seam (STIS) wells
- Better information
  - Down hole tools for desorption levels, gas saturation level and gas content
  - Improved identification of methane gene
  - STIS well logging techniques
  - Fibre optic flow sensing
  - Collection system monitoring
- Faster short term drainage
  - Coil Tube Drilling (CTD)
- Low permeability / high CO2
  - Nitrogen flushing
- Boggy zone
  - Surface vertical or STIS drilling
  - Tight radius drilling (TRD)
  - Large diameter augers
  - Advancing casing



More efficient remote mining

- Remote flighting with shuttle cars
- Remote operation of a road header
- Automated bolting – ACARP roadway development
- Haulage system alternatives

Understanding Threshold Limit Values

- Appin – West Cliff plan consolidation
- Wongawilli appropriate levels for future mining
- Different CH^4 sources
- Nitrogen flushing impact

- Oil & gas industry tools for determining gas saturation levels and under saturated fields.
  - Compare different gas regimes
  - Create an alternate to cores for evaluating gas content

Conclusion

- Seam degasification is a major component of Bulli Seam operations; ~160,000 metres per year drilled at Appin alone
- Meeting TLV's drive significant effort in localised areas
- Reduction to 3-4 m^3/tonne yields highest mining productivity
- Efforts are focused on improving drainage & remote mining productivity
- Integration of the West Cliff & Appin management plans is the key activity regarding levels.
- Recent experience shows outburst events occur at levels above the current thresholds
- Improved tools are the preferred method to re-evaluation of the appropriate TLV's