

ADVANCES IN GAS DRAINAGE & GAS MANAGEMENT WITHIN AAMC

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“RICH” GAS MANAGEMENT

- Overview
- Grasstree
- Moranbah North
- Grosvenor project
- Forward

OVERVIEW

General

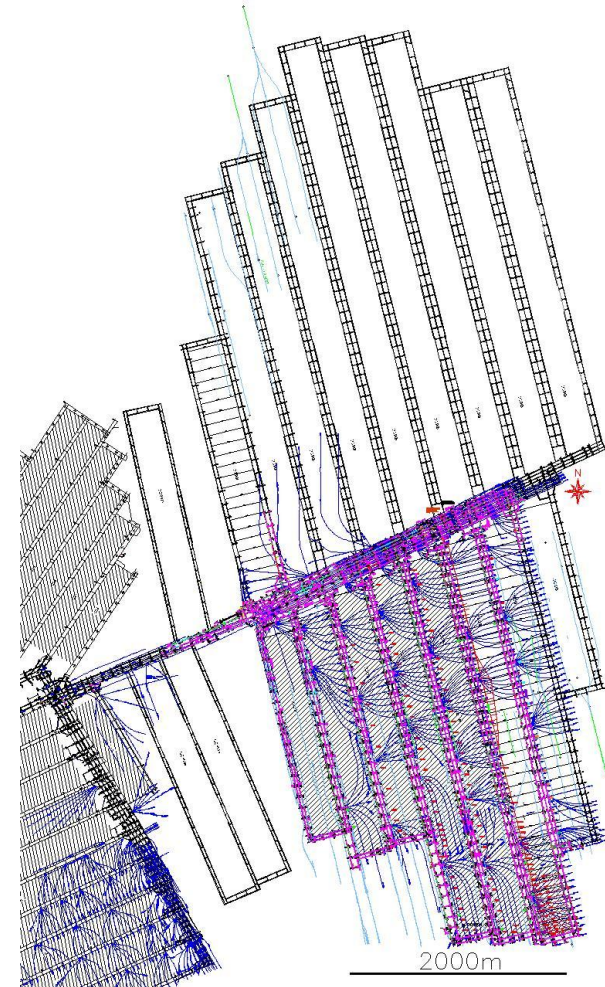
- Bowen Basin underground mining of hard coking coal
- Two operating longwall mines, one project close to start up.
- Multiple seams above and below the target seam contributing to high specific gas emissions
- Pre-drainage necessary for outburst mitigation, rib emission control and water management.
- Strategy developed for >3 year SIS pre-drainage supplemented by UIS pre-drainage.
- All gas collected to common surface vacuum plant.
- Strategy for waste gas – objective of all mine gas to be transferred to 3rd parties or flared on site.
- NGERs monitoring and reporting of coal mine waste gas

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GRASSTREE

- 3 heading gateroads
- German Creek seam ~2.7m thick
- Generally moderate permeability ~10mD
- Gas content typically 10-15 m³/t CH₄
- Typical annual CH₄ drainage mix:
 - SIS **6.4 Mm³**
 - UIS **17.2 Mm³**
 - Goaf **86.9 Mm³**
- Goaf drainage typically 4-5000 l/s



Grasree mine layout and pre-drainage arrangement.

GRASSTREE POST DRAINAGE

- Goaf emissions typically 5-6500 l/s (STP)
- 250mm diameter wells
- Typically 8 wells in operation
- Presently 50m spacing
- 16m of tertiary casing, remainder openhole
- Wellhead pressure -10 kPa
- Peak flows 900 l/s @ 90% CH₄
- Average flow 400 l/s
- Typical well life is 41 days
- Composition monitored at vacuum plant by a tube bundle system.



GRASSTREE POST DRAINAGE

- Vacuum plant comprises of 6 Nash 2BE 420-2 liquid ring pumps
- Nominal flow 1100 l/s (STP)
@ -40kPa
- Discharging to:
 - EDL power station
 - Candlestick flare
 - Enclosed flares
 - Vent during plant shutdown.



GRASSTREE POST DRAINAGE

- 5 enclosed flares with 1100 l/s capacity
- One candlestick flare with 2600 l/s capacity

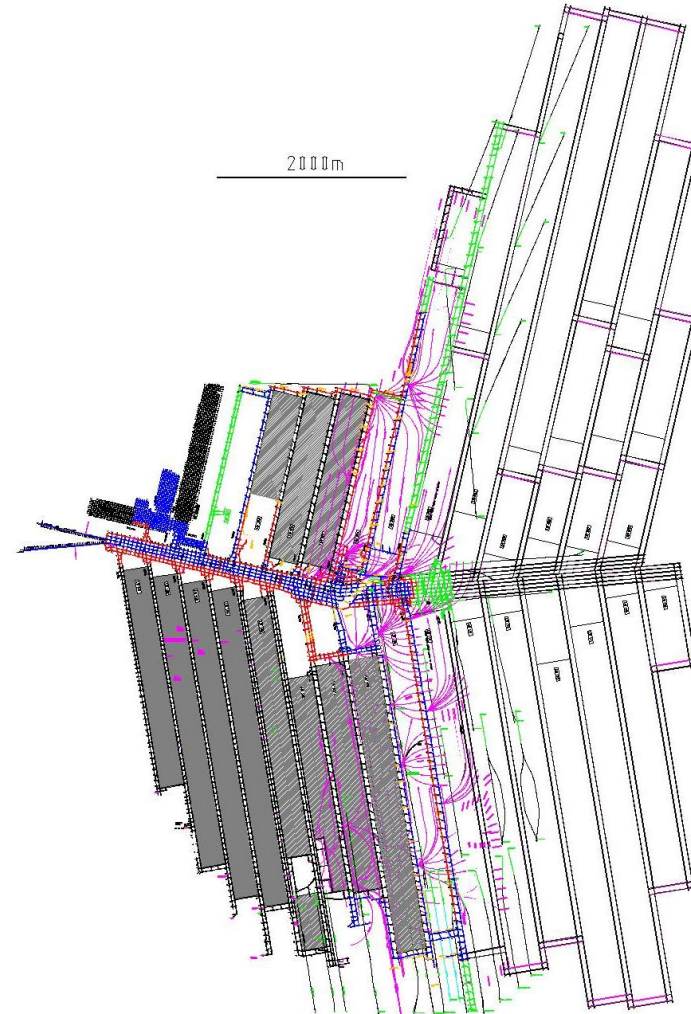


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MORANBAH NORTH

- 11km extent North/South of lease boundary
- Generally high permeability ~100mD
- Gas content typically 6-12 m³/t CH₄
- Goonyella Middle seam ~5.6m thick
- Typical annual CH₄ drainage mix:
 - SIS 72.5 Mm³
 - UIS 37.2 Mm³
 - Goaf 13.5 Mm³
- Immediate roof can be massive units
- Tertiary includes extensive basalt with local running sands.



MORANBAH NORTH

- Goaf drainage condition complicated due to geological conditions:
 - Tertiary's include basalt channels up to 140 m deep
 - Associated with the basalt are running sands and gravel
 - Beneath basalts lie the Fairhill measures with a tendency to fret/swell
 - Sandstone channels above the longwall affect caving and the upper seam desorption behaviour.
- Goaf hole design requires 14" casing to 200m with 10" slider to remain competent.
- Peak flow ~450 l/s
- Average flow ~250 l/s
- Goaf drainage ~1500 l/s



Moranbah North goaf well head arrangement

MORANBAH NORTH VACUUM PLANT

- 3 Nash 2BE1405-1 pumps
- Nominal capacity 1675 l/s @ -30 kPa operation
- Proposed upgrade to 6 pumps for higher SGEs.
- Discharge to a compressor station and EDL power station.
- Gas composition monitored by gas chromatographs



MORANBAH NORTH

Pre-drainage

- High seam permeability and reservoir thickness well suited to SIS pre-drainage
- Peak flows up to 700 l/s, wells lasting 5 years.
- “P” seam pre-drainage being conducted to assist goaf emissions.
- A portion of the SIS gas is transferred off lease to Arrow Energy Ltd



Moranbah North SIS wellhead

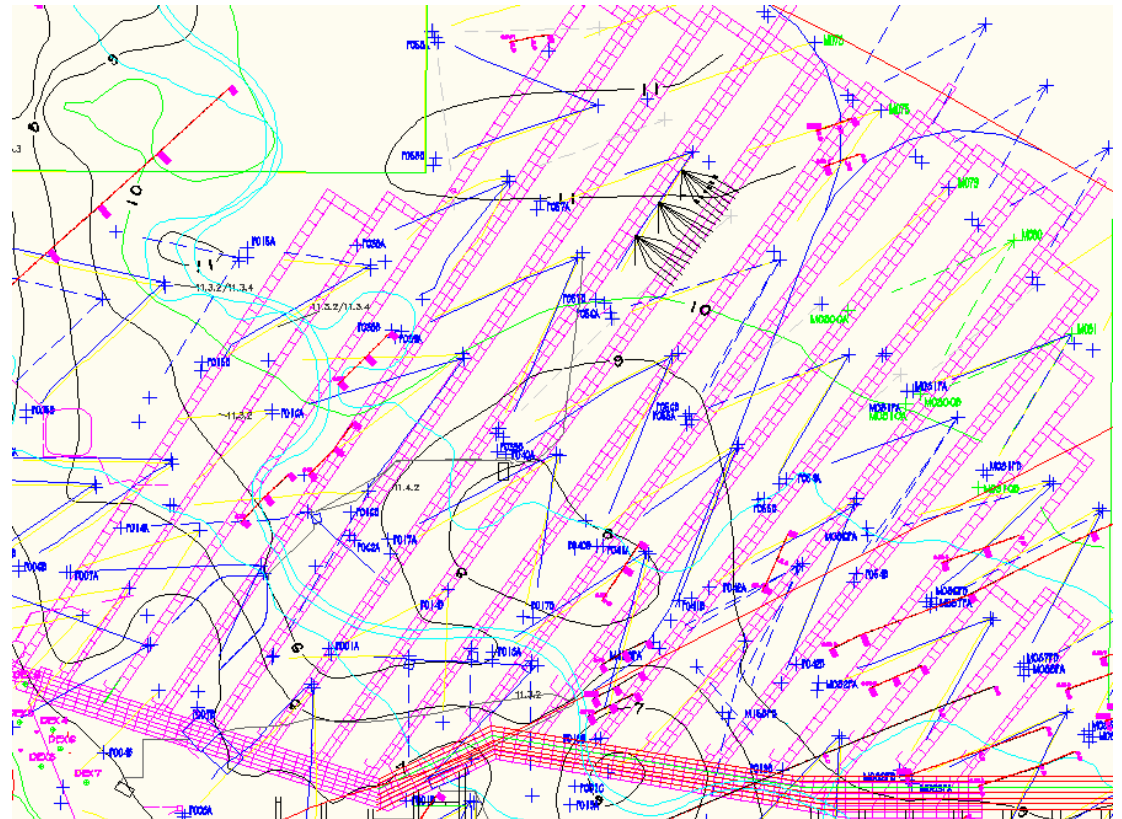
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GROSVENOR PROJECT

Pre-drainage

- Petroleum lease owned by 3rd party
- Mining lease owned by AAMC
- Pre-drainage of GM and P seams
- Similar conditions to Moranbah North



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LOOKING FORWARD

Initiatives

- Trial horizontal goaf holes at both operation sites:
 - Moranbah North to provide alternative means of drainage close to the face but avoiding basalts and maintaining a stable drainage horizon
 - Grasstree to provide good connection between vertical goaf wells and the immediate desorption region above the longwall.
 - Both sites, to enable goaf drainage where surface access is impractical for vertical wells.
- Optimize the goaf drainage infrastructure by increasing the operating pressure of the goaf plant, increased pipeline diameter.
- NGERs monitoring, significant changes in well monitoring and data collection to satisfy NGERs requirements.
- SIS well design to target development pre-drainage, rather than reservoir depletion. “Smart” ways of optimising layouts
- Use of blowers to maximise recovery from old SIS wells
- Use of piezometers for monitoring drainage effectiveness.

THANK YOU