

A.B.N 91 383 829 253

BLACKROCK MINING SOLUTIONS PTY LTD

Providing technical services professionals to the mining industry

**Contracting Geologists, Geotechnical Engineers, Surveyors
Mining and Civil Engineers**

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Introduction

Blackrock Mining Solutions is a small company which can provide your operation with professional technical consulting and contracting services. Blackrock Mining Solutions specialises in the delivery of professional geotechnical services, strata characterisation and operational geology and geotechnical consulting. Including independent inspection and quality assurance processes for the application of shotcrete support and linings in the coal industry.

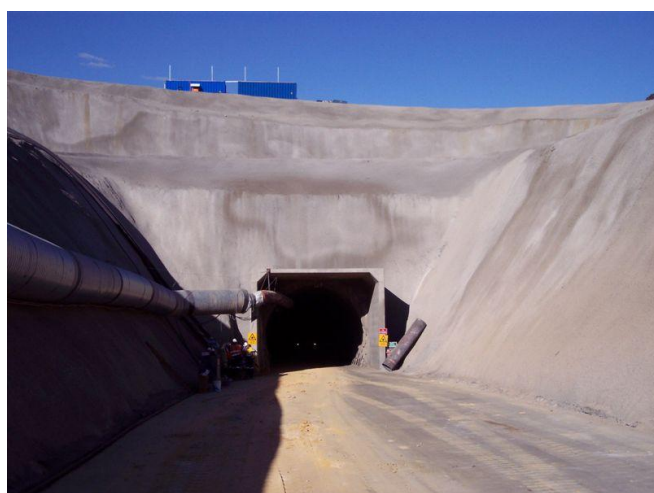
Our aim is to deliver quality solutions to our clients by providing a full range of services across the mining disciplines, project management and delivery of project outcomes to the clients expectations. Along with mining method selection studies, mine planning and reserve optimisation.

Blackrock Mining Solutions has senior level staff with many years of experience in the coal mining industry within Australia's Queensland, New South Wales and Western Australian coalfields, along with New Zealand's various coal basins.

Shotcrete Application Experience

Blackrock Mining Solutions has experience in the application of shotcrete in most coal mining environments.

Including box cuts, new drift drivage, drift remediation following failures, shafts and in-coal roadways.



Shotcrete Quality Assurance Process

As with all strata support, quality assurance is the key to ensuring performance against the design and plan.

Blackrock provides independent monitoring, compliance audits and QA documentation for the clients records through all stages of the project.

A typical QA Process from project initiation includes:

- R&D testing of a proposed shotcrete batch design against the design specifications, prior to any application.
- Design of testing regime to meet the requirements of the applicable Australian Standard. Typically including
 - o Beam Tests,
 - o Round Determinate Panels
 - o Cast Cylinders
 - o Energy Absorption Testing
- Coordination of the sample testing program with contractor and testing facility (UNSW)
- Analysis of laboratory test results from trial batches & recommendation of which product to use.

Design and implementation of an ongoing QA process that ensures that both the application contractor and batch plant contractor has a defined set of QA checks that are conducted prior to and during the application process. The QA checks are reported on each shift, analysed and audited by Blackrock's Engineers to ensure compliance. Any non-compliances are identified, tracked and rectified as required. All records are then collated for the client.

The QA process stipulates a number of testing regimes to be put into place in order to check that the quality, strength and load parameters of each batch of shotcrete applied is in accordance with the initial design's test results. Testing is linked to a time and area of application such that if any non-conformances can be identified and tracked to the application location.

Routine QA tests typically include:

- Batch plant shotcrete design documentation for each batch as it's mixed, confirming ratio's of each component and moisture content.
- Slump tests performed for each batch (truck load) of concrete mixed. Ensuring the mix falls within an acceptable tolerance as per design, and these results are used to determine if a particular batch is accepted for application or turned away.
- Review of the AltiCal testing results – an independent test to confirm the batch plant mix design is not changing.
- A series of test cylinders, cast at the batch plant for every 50m³ to test for 7, 21 and 28 day UCS results. These results are used to compare the applied product against design, throughout the whole installation process.
- A single cast cylinder at the point of application, to check against the 7 day test results of the cylinders cast at the batch point, to check for any degree of separation between the batch and discharge locations.
- Round Determinate Panels (RDP's) sprayed at 50% and 95% the way through the job, to provide a direct comparison against the initial test results which the design is based on.



In addition to the reviewing of documentation, Blackrock's Engineers perform and record a number of operational and logistical audits during the course of each day. These audits may include:

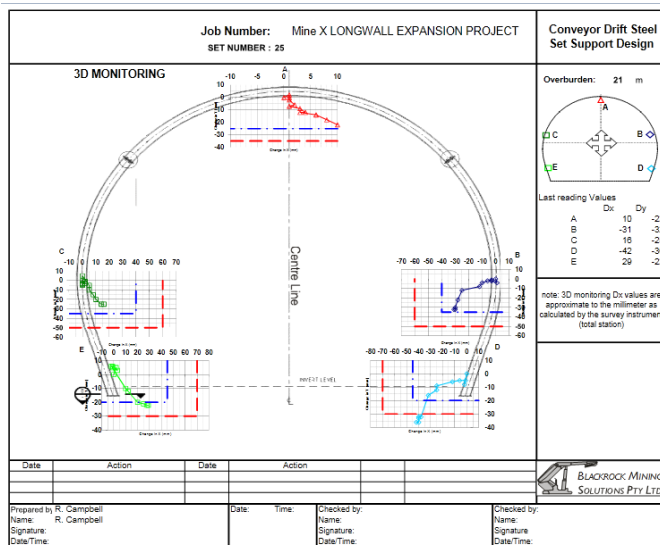
- Inspecting the hydro-scaling process – using high pressure water dislodge and remove any loose material, prior to spraying shotcrete.
- Observe the shotcrete application process, to ensure that all procedures are being followed and the thickness of the shotcrete application is being maintained throughout.
- Witness the slump testing, to ensure that it is carried out in the correct manner.
- Observe and be present at the mixing of shotcrete batches', to ensure that the correct procedures are being followed and the right ratio's of each raw material are being added to the mix.
- Be present for tool-box meetings, in order to discuss any issues that may have arisen with the shotcrete operators.
- Witness the spraying of the RDP's and casting of test cores – to ensure that the correct procedure has been maintained and is compliant with previous spraying of panels.
- Auditing of installed reinforcement against support plans and design

At the end of the project all documentation, test results and data is summarised in a report format, supplied to the client for their records.

Geotechnical Performance Monitoring

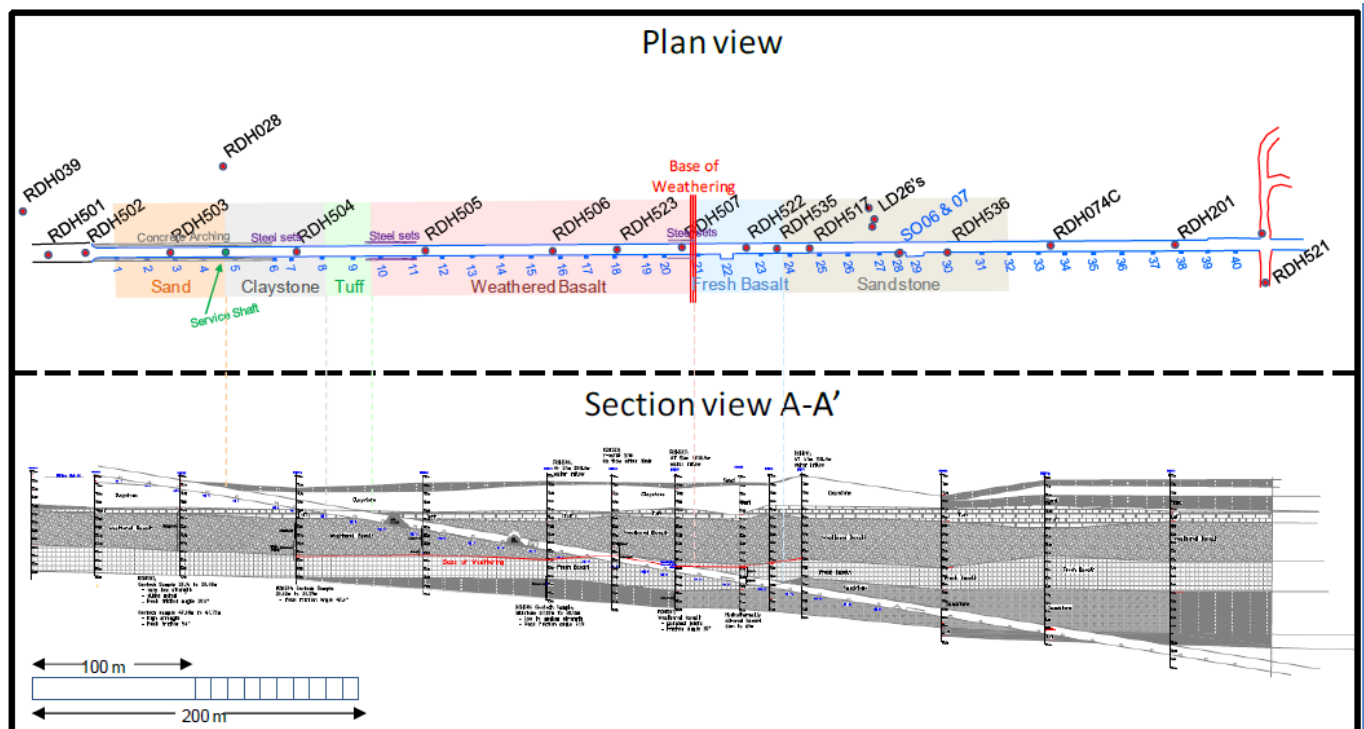
Geotechnical performance monitoring is a vital component of any support design. Blackrock Mining specialises in the design and installation of fit for purpose monitoring equipment to ensure the performance of the as built structure can be checked against the design assumptions.

The monitoring systems can also be linked to mine site TARP's with remedial plans to address any instability.



Geotechnical Mapping and Strata Characterisation

Blackrock Mining Solution's engineers are experienced in all aspects of underground mapping and logging of excavations. For new drifts and remedial works we provide a service that includes the mapping of the faces and reconciliation against the design expectations. Ensuring that no unexpected conditions are encountered without adequate records and remediation put in place.



Client Base

Blackrock Mining Solutions has recently undertaken work for the following clients;

- Anglo American Coal Pty Ltd
- Anglo Coal Moranbah North
- Anglo Coal Grasstree Mine
- Vale – Carborough Downs
- BMA Broadmeadow Mine
- Solid Energy New Zealand
- Coal Mine Services
- Cook Colliery
- BHPB Dendrobium Mine
- BMC Projects Hub
- Vale - Integra Coal
- BMA Crinum Mine
- North Goonyella Mine
- Xstrata – Newlands Mine
- Xstrata – Oaky Creek Complex
- Mastermyne
- Minova Australia

Our People

Blackrock Mining Solutions employs only quality staff who are industry proven professionals, and the company has a firm belief that our staff are our greatest resource. The management structure is such that each employee is supported to ensure they can and do deliver to the client's expectations or better.

We bring a vast and diverse range of experience from both a technical and operations background and can provide quality best practice services for your projects.

Additional Information

The principal of Blackrock Mining Solutions is a Registered Professional Engineer in Queensland and Chartered Professional Engineer, and as such all work is done under supervision, as required by the current legalisation. In addition professional supervision of clients employees/contractors can be undertaken as part of the services provided.

Blackrock Mining Solutions Pty Ltd carries \$20,000,000 Public Liability and Product Liability Insurance and \$1,000,000 Professional Indemnity Insurance for all consulting and contracting services.

Contact us

If you would like to discuss Blackrock Mining Solutions capability or how we can assist your project or operation feel free to contact us at r.campbell@blackrockmining.net, or call us on 04396-93266 to arrange a meeting at a convenient time.