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New mining record

Groutech smashes through fault zones

Commonly, when longwall miners mine through a faulted zones there is expected lower production due to cave-ins. Recently (June 2004) at Newlands Southern Underground Mine a new site production record was set whilst mining through a fault zone. The results were only four tonnes away from the national record for mining through a general coal seam. This was made possible due to methods of cementitious foundation grouting by Groutech (Aust) Pty Ltd.

Groutech have been engaged on a number of occasions to consolidate fault zones for Newlands but none as big as Chloe's Fault. After injecting 26 Tonne of microfine cement into the strata over a 6 week period the fault zone was not only safer to mine through but actually allowed increased production.

In late 1998, ACARP in conjunction with North Goonyella Coal conducted a trial on pre-consolidation grouting. "Due to inconclusive results from other contractors, Groutech (Aust) Pty Ltd was contracted by North Goonyella Coal to attend to underground trial work involving injection of microfine cement grout. The methods adopted for the grouting trial were proven to be successful for any underground mine." ACARP C7017 – December 1999. In mid 2000, North Goonyella Coal mined through the grouted fault zone and no problems were reported. In fact, production through a fault zone was increased significantly compared to the adjacent panel which was not grouted.

Coal injection process.

A more recent ACARP report – C10019, August 2003, confirms the effects and need for consolidation grouting performed by a professional company.

Groutech have worked on several projects for mines such as: Newlands Southern Underground, Newlands Northern Underground, Oaky creek no.1 Mine and North Goonyella in addition to a lot of civil work for the Department of Main Roads, Queensland Rail and various Queensland city councils.

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DIGGERS & DEALERS

The goldfield's plucky juniors have impressed the dealers at this year's Diggers and Dealers Mining Forum, the 12th annual mining industry event held in the Western Australian town of Kalgoorlie from 26-28 July 2004. Chairman Brian Hurley says "This year was a little more sombre than I expected," of the event. "This surprised me because with the gold prices (in Australia) up I expected champagne corks popping all over the place!"

Consolidation in the eastern goldfields mining industry, an industry once occupied by the more junior end of the market but now dominated by international giants, has also undoubtedly had a significant impact on the mood and content of the almost religious gathering.

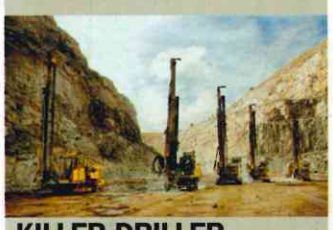
Jackie Cooper reports.

See page 26.

BHP considers Boodarie shutdown

BHP Billiton said that it is making contingency plans for a possible permanent shut-down of its troublesome Boodarie hot briquetted iron HBI plant in Port Hedland WA. An article in *The Australian* found sources that say permanent closure of the huge facility on safety grounds is being seriously considered even though a worldwide steel industry boom has pulled HBI prices up to the point where Boodarie is capable of making money for the first time in its history.

Boodarie was idled after a fatal accident two months ago. If it stays shut, around 500 workers will lose their jobs and BHP Billiton will have to account for a long-term 'take or pay' ($1.03 billion) commitment for the supply of feedstock gas to the plant.



Chloe's consolidation

On site at Newlands Southern.

Newlands Southern Underground Coal Mine.

Newlands Southern Underground Coal Mine requested Groutech Aust Pty Ltd to perform grout injection through the N5 Panel, Chloe's Fault Zone. The purpose of this was to consolidate the strata through the fault zones. The area to be grouted was reached from the surface. The project was carried out from the 8th December 2003 to the 17th February 2004 with a two week break for Christmas and new year.

The main objective for Newlands Coal was to provide a proactive support system to stop or control cave ins while mining through fault zones - specifically, consolidate the strata around the Chloe's Fault Zone. Cave ins adversely affect the mines productivity and profitability.

Groutech's objective was to inject the maximum number of kilograms of cement into the strata as possible. Removing void space strengthens the strata and reduces its ability to move. The company says using professional foundation grouting techniques is the only way to achieve this.

One hundred and ten holes were drilled by a drilling contractor prior to Groutech's arrival. The holes were from 180m to 200 m deep to intersect the void. Groutech flushed out the holes to remove any fine particles and inserted poly injection tubes to the bottom of the hole. A Portland cement packer was then constructed to isolate the 15m area to be grouted at the bottom of the hole. A water test was conducted and recorded. Microfine cement was then injected into the strata to consolidate the fault zone

The records show a total of 26 tonne of microfine cement was injected into the strata around the Chloe's fault zone - the average grout take of 13.6kg/m injected into the strata per hole. This indicates that there was a considerable fault present and confirmed the need to consolidate with foundation grouting techniques. The strata took more than double the quantity of grout originally estimated. The contract was completed in only 40% more time than allowed. This may have been reduced if the crew did not have to allow for heat stress management and contend with storms and flash flooding.

By grouting alternate holes as primaries first and then grouting the in between holes as secondaries Groutech says it can prove foundation grouting techniques work. Significant reductions in void space are shown by recording the difference in water test results in the secondary holes before and after the primaries are grouted. An average reduction of 55% was recorded for this contract. This opens the door for developing a reduced drilling campaign in due course.

Microfine cement was used to inject into the strata at various mix ratios according to the water test results. Microfine cement has a maximum particle size of 12 microns which allows penetration into voids thinner than a piece of paper.

Grout takes varied from 0 kg/m up to 160.0 kg/m. The average grout injected into the strata for each hole is 13.6 kg/m. When the larger takes are shown on a site plan and connected, they give a general picture of the fault line.

By viewing the records and results it is considered the stratum at the N5 panel (Chloe's Fault zone) has been grouted and consolidated as effectively as possible. The reductions in lugeon values of the secondaries indicate a successful grouting process.

To prove consolidation beyond doubt it would be ideal to drill holes between the primaries and secondaries. These holes would be called tertiaries and when water tested would indicate the extent of permeability. If the tertiaries required grouting then further holes called quartenaries would be used for the same process to prove consolidation. This is called the split spacing method of grouting.

The fault zone appears to have been quite fragile in places by the number of hydro fractures which occurred. Groutech stresses the importance of handling this type of strata correctly. If hydro fracturing is not managed and controlled quickly then serious damage can occur. It would then require extra holes to be drilled and grouted as well as previously grouted holes to be re-grouted. The results of the holes surrounding the hydro fractures show that Groutech's technique kept this situation under control.

For further information contact 07 3284 4033.

Mining the Meaning

Pre-consolidation Grouting

Pre-consolidation grouting, foundation grouting, is often used in mines to ensure mining productivity is maintained. The process is used to solidify strata and subsequently stop falls and cave-ins in underground mines. It is a proactive process in that the strata are solidified several months prior to mining through the area. This is a sensible means of insurance. The old process of mucking out and solidifying the face falls with poly-urethanes is not only expensive but a very dangerous chemical injection process. Pre-consolidation uses cement grouts and goes a long way to removing most if not all of this dangerous process.
ACARP Research Project *C7017 Dec 1999* has been commissioned to manage moving the industry onto newer and proven techniques like pre-consolidation.
The process can be completed above or below ground. Benefits include:

- Maintainance of continuous productivity
- Proactive management of cave-ins and face falls - increasing safety.
- Introduction of new technology and processes to the mining industry.
- It is an environmentally friendly process.

Proactive management

The mining industry has realized that the reactive approach of solidifying face falls with poly-urethanes is not conducive to productivity. A face fall could occur, meaning the longwall would then have to be mucked out, losing many days of production, only to have another face fall within hours of start up; a painful, hard won progress. Dangerous chemical urethanes would be used for their fast setting abilities. All in all it was a lose—lose situation.
Groutech were approached to prove that foundation grouting techniques and processes could be used to proactively manage the face falls. This was done by drilling holes through the fault zones, and using proven construction industry techniques, injecting cement grouts to stabilize the strata. All this was completed months before the longwall was working near the fault zone. Many projects later, it is now clear the introduced processes have worked very well. Results are now a matter of history as there have been no face falls in pre-consolidated strata since introduction. Many believe there is no doubt this is the way to go forward.

Prospect Awards nominations in!

Nominations for the inaugural Australian Mining Prospect Awards have now closed and a panel of editors from the manufacturing division of Reed Business Information and specialists from the mining industry will study the entires and look for clear and demonstrable examples of superior performance to determine the finalists for each of the eight categories (see box).
The Prospect Awards have been established to recognise and reward excellence in the Australian mining industry. As Australia's leading technical mining magazine, Australian Mining has delivered must-read information about equipment, techniques, methods and services to industry since 1908, and is universally recognised as the number one mining authority for senior management, supervisors and technical management in the industry.
As markets rely more and more on names they can trust, customers are demanding excellence and innovation from suppliers. The Prospect Awards program is recognition of this. One of the main goals of the Prospect Awards is to highlight excellent performance and creativity, and in turn instill and encourage these virtues in the industry.
Australian industry should be proud of its achievements and is deserving of greater recognition for its successes. It is this the Australian Mining Prospect Awards hope to deliver.
All four finalists in each category will be profiled in the next (October) issue of the magazine. From the finalists selected, the judging panel will then determine a winner and highly commended entry in each category. Winners will be announced in the December issue of Australian Mining, as well as being featured on www.ferret.com.au.
Winning companies will be presented with their trophies and certificates at an awards presentation in Sydney in November 2004. Highly commended companies will be presented in November 2004 at the highly commended company offices.

Australian Mining Prospect Awards

Australian Mining PROSPECT AWARDS

Categories and Sponsors

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