

COAL AND GAS OUTBURST COMMITTEE

HALF DAY SEMINAR – Wollongong 23rd November, 2011

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Editor’s Note: Please refer to the University of Wollongong Mining website at the following address for a better, colour view of the presentations. <http://www.uow.edu.au/eng/outburst/>

Recent Outburst Incidents in Mexican Coal Mines

Brian Nicholls – Title/association???

Questions and Discussion

Anon. – How deep are the mines?

Brian – Esmeralda, the older of the two mines is around 400 m and Number 7 Mine is around 260 m. They are retreat longwalls. Development is relatively slow with low powered roadheaders and because they support with arches. They seriously need to consider continuous miners. They have a serious issue with transporting equipment, the arches in particular.

Robert Gordon, BHPB - Did the roadheaders react to gas trips and cut out prior to or in association with the outbursts?

Brian – They do not have the sophisticated controls we have on our miners, but they are now cowboys either. Gas contents might vary within the seam ahead of the face.

Russell Packham, Anglo – Was there gas coming out of the holes that you saw where the outburst occurred?

Brian – We only saw the holes at the face where the outburst occurred. There was some gas coming out but not a lot. Bear in mind the holes were only short face holes.

Russell – We conducted similar drilling at Mt Davy in New Zealand where there was 9 to 10 m³/tonne of CH₄, with a lot of outbursts. Permeability was very low and holes produced little to no gas. We tried what you described. We drilled short holes into the face to try to de-stress and drain gas. It wasn't successful. The only way to mitigate outbursts was by shotfiring.

Brian – That was one of the options we gave them. They have to know what is ahead of the face and they have to reduce the gas content there. If they cannot reduce the gas content, then they will have to advance by shotfiring or something safer than they are now doing.

Chris Harvey, Gujarat NRE – Were the holes drilled in the bottom 1 m of the seam?

Brian - Some of the holes were drilled in the middle of the seam. The bottom section is so friable, the holes there tend to crush and close. With the gas mainly in the bottom section and with the mylonite on top of it, the best way to get successful holes is to drill in the middle section and, using survey control, to dip down into the bottom section periodically. Of course, this cannot be done using rotary scroll drilling. They are using old drilling technology but the rest of the mining processes are well set up.

Marc Justen, X Strata – I imagine gas content testing is going to be a real issue for them. Where is the testing laboratory? If they are going to relate their conditions to Australian outburst prevention measures, they are going to have to test their gas according to Australian standards.

Brian – They don't have anything like the facilities we have. I have recommended to them that they have some cores collected and sent to Wollongong Uni or to our other labs in Australia. It is a big company with big problems, so I expect they will be prepared to set up what they need.

John Hanes, Outburst Seminar Committee Member and Editor – The following comments are mine and not necessarily those of my colleagues on the Outburst Committee. I feel qualified to make them based on my long history of working with outbursts and in-seam drilling since 1973.

Brian's presentation has been a frightening case of déjà vu. I was naïve enough to think that modern coal mining had solved the outburst problem and that the miners at the face were safe from outbursts.

The outburst that killed the 4 men at Esmeralda was nearly a repeat of the **1978** fatal outburst at Leichhardt Colliery in Queensland, except for the use of roof bolting at Leichhardt and arches in Mexico. At Leichhardt, the practice of face drilling using rotary drilling and scrolls for 40 m ahead of the face, then mining soon after was accepted practice. No gas was evident at the mouths of the holes. Later research work showed that the gas did not start to flow from the holes or drain gas for a period of at least 60 days. Where the holes stood 3 months before mining commenced, no outbursts occurred.

At West Cliff Colliery in 1994, there was a fatal outburst in a face that was "protected" by holes drilled ahead using rotary drilling, but not surveyed. After the outburst, it was shown that the holes had wandered away from the heading location, so they gave no protection to the drive.

These Australian incidents, including the mistakes made that contributed to them, and the work done to prevent outbursts including efficient in-seam drilling and borehole surveying were well documented in the proceedings of the International Symposium-cum-Workshop on Management and Control of High Gas Emissions and Outbursts in Underground Coal Mines, published in 1995 and in the book by Lama et al that summarised all the findings from the Symposium and the state of knowledge in 1995. In more recent years, the presentations made on outbursts and gas management to the Outburst seminars in Wollongong and, up to about 5 years ago, the ACARP Gas Management seminars I organised in NSW and Queensland, have been made publically available (to anyone who can read English) on the UOW Outburst website thanks to Professor Naj Aziz. www.uow.edu.au/eng/outburst/.

In his presentation elsewhere in these notes, David Cliff laments the loss of mine history with the itinerant nature of mining professionals and the ageing of the people in the industry. This

is not new. In my experience, there has always been a tendency for many mine professionals to believe the history of their mine started when they started. The past holds the keys to understanding what is happening now. The history of a mine should not be locked up in the minds of the older guys who are retiring. It should be documented progressively and force fed to each new arrival until he is fully knowledgeable of the achievements and mistakes made before his arrival. This is happening in the teaching sector, but needs to continue on the job. The achievements and mistakes of a mine should be shared amongst the industry, locally as it is here in Australia, and internationally. Young professionals should be encouraged by their management to share their knowledge at forums such as the Outburst Seminars and ACARP Workshops and Coal 2012. The first two are fairly informal and provide a non-threatening and appreciative audience for communication of latest developments. Freely sharing this knowledge will not give a commercial disadvantage, quite the contrary.

Advances In Gas Drainage and Gas Management Within AAMC –

Russell Packham (title/position/company)

Questions and Discussion

Robert Gordon, BHPB – What do you attribute the high purity of drainage gas at Grasstree to?

Russell – Initially we did some full seam coring and found gas content of the Tieri seam to be negligible, the Corvus seam around 6 m³/tonne and the German Creek around 13. So it is hard to explain why the overall gas make is so high. There seems to be another source of gas other than the primary seams. The gas that arrives at the longwall face can come from anywhere in the immediate 150 m above the seam. The holes are 320 m deep but only have the top 16 m cased. The strata above 150 above the seam is partly de-stressed by passage of the longwall, so any gas in that strata will be released. This gas would probably not present to the longwall but it is going up into the borehole and into the drainage system. So perhaps the reason for the high total gas drainage volume is due to capture of gas from the nearer-surface seams as well as from those seams within 150 m from the mined seam.

Marc Justen, X Strata – Regarding the horizontal goaf wells, I can understand how they could be drilled in thick seams, but you talked about drilling in stone.

Russell – Horses for courses. There are two issues that must be considered. The first is the drilling technology which is technically challenging with the large diameter and the lengths of the holes. The other issue is where do you put the hole? How do you maintain operations at low pressure? With SIS holes, most of the operations are at high pressure. Most of the water and gas is partly forced out by the gas pressure. In horizontal goaf holes under low pressure, any undulation in the hole will trap water. The horizon we target is very significant. At Braemar (???), we will probably drill in the sandstone until we get a competent hole and when it fractures, we should then get gas from above and below. There is a tuff band in the P seam, which would interfere with drilling. It could swell and block the hole. Another option might be to drill in the P seam proper to pre-drain it then drill another hole to control the water.

Lei Zhang, UOW – Are you doing your own testing for collection of geological data such as permeability or do you refer to a data base?

Russell – We do some testing, but we also rely on data from Coal Seam Methane industry testing. There is a data base called Cudex which is a national data base of all the exploration holes that have been drilled. It is freely available. We also have the results of tests by Arrow Energy in our areas. The permeability at Grasstree is undoubtedly high.

Lei – Do you do in-hole permeability testing or is it done in the lab?

Russell – Generally the data on permeability is from drill stem testing, not from lab testing.

Effective Response to an Emergency at an Underground Coal Mine –

David Cliff, title/position/association???

Questions and Discussion

Anon. – What is your opinion on the ability of mines in general to respond to an emergency, considering the transient nature of the workforce? This question is especially related to Queensland where there seems to be a high turnover of personnel and people don't stay in the one place long enough to develop a knowledge of the history. .

David – There are mines in Queensland where the mine manager has only been there for a year and the ventilation officer 6 months. There is a lack of corporate knowledge in these places about the idiosyncrasies of the pit.

Anon. – We risk-assess everything in mining. We need to risk-assess the loss of corporate knowledge.

David – We need to keep that knowledge. I am not a miner, but I see that practical solutions to problems in the past hold the key to problems today. But how similar problems were solved in the past are being lost. In some mines, the knowledge of how a problem was not efficiently dealt with in the past needs to be remembered so poor solutions is not repeated. Non-text book knowledge is being lost rapidly.

Peter Wynn, Consultant – Based on your experience of disasters, what is your opinion on the use of refuge chambers?

David – I am not a fan of refuge chambers. But, where the men cannot easily escape to the surface, and a place for men to collect and regroup and to find out what is happening prior to escaping to the surface, then they have a role to play. But I do not like the idea of the men locking themselves in a chamber and then saying “come and get me”. At Big Branch, the men sealed themselves in a refuge chamber and everyone thought they would be OK. There are examples where a refuge chamber cannot be used safely and examples of where it can be used. I prefer to call them a fresh air base. Somebody recently asked me if they are explosion-proof. The answer was “no”. Some are more robust than others, but being explosion-proof is not their purpose. But a refuge chamber might be the only answer in a deep shaft mine where there is no easy path of escape to the surface.

Wayne Calder, General Manager, Coal Sector Assistance Branch, Department of Resources, Energy and Tourism

Questions and Discussion

Steve Pratt, Consultant – Will the Government grants be taxed? There have been cases in the past where the Government has given a grant to support research or a project and the company has to pay back a heap of the money as tax.

Wayne – No, it won't be tax-free. Normal taxation levels will apply to any grants.

Chris Harvy, Gujarat NRE – Will you be notifying each of the 500 companies that are eligible for allowances through the coal sector package?

Wayne – There won't be 500 coal companies eligible. The 500 companies are across the entire economy. We won't inform each one and any company interested in an allowance will have to apply. We have information we can source from the Department of Climate Change through the ?? data base, but we need to make sure that covers all the companies that we think will be eligible. So we will have to open it up for applications and have companies apply .

Naj Aziz, UOW – I assume there is a common formula to calculate the carbon tax for each tonne of coal produced. But different coals have different carbon contents . Where do we find the formula to be used?

Wayne – That would be in the ??? methods. They have various methods for determining the fugitive emissions for coal mines, so coal mines would adopt the appropriate methods. Method 4 for example is for monitoring emissions. In Methodology 1, there are set factors which apply to coal mines. So mines will have applied, the set factors that apply to their state.

Chris Harvy – The tax is actually \$23 per tonne of CO₂ equivalent. One tonne of CH₄ is equivalent to 21 tonnes of CO₂ equivalent. Therefore your ventilation monitoring and reporting now becomes very critical because it determines how much your operation will be taxed. Typical practices of mines in the Southern Coalfield of just venting gas to atmosphere will need to change to flaring to reduce the cost factor of 21 tonnes to 2.75 tonnes CO₂ equivalent (I think).

Robert Gordon, BHPB – I read recently that flaring of CH₄ would have a similar effect to venting to atmosphere.

Wayne – We don't handle those issues. The question needs to be addressed to the Department of Climate Change.

Brian Nicholls – Given there are to be some considerable costs on operators, what sort of cost analysis has been done by the Government. How much does the Government believe companies can pay. Have the potential future coal prices been taken into account including potential downturns in revenue? What the companies have to pay will partly determine whether they continue to operate and continue to employ.

Wayne – Treasury would have done all the modelling. The carbon price would have been set for the whole economy, not just for coal producers. It is all tied to the price needed to get the impacts the Government wants to achieve a 5% reduction in CO2 emissions unilaterally by 2020 and 80% by 2050. To help achieve these goals, there is a need to look at fugitive emissions of CH4.

Brian – Given the revenue that the Government is currently getting from coal, any extra imposed costs could reduce the amount of coal exported and thereby reduce the revenue to Government from those exports.

Wayne – That would be part of the Coal Sector Jobs Package and in the longer term would have to take into account the variations in coal prices and volumes.

We are focussed on implementing the two coal packages. The Government has passed the legislation, so we are working on the count down to 1st July, 2012. We are focussed on getting done what we have to so we can get first payments to the Coal Sector Jobs Package by June 30.

James Caldron – You have talked about future emissions from coal mines. Whose responsibility is it for emissions from mines that are closed?

Wayne – Fugitive emissions from decommissioned mines are not counted in calculating the carbon price.

Anon – I did not understand what the jobs training part of the package was for. Is it for retraining people who lose their jobs?

Wayne – There is recognition that there will be a cost impact on coal mining companies and some jobs may be lost. There will be money to provide some time to help the companies adjust and continue their operations while looking at how to reduce their liabilities.

Ben Web, Integra – Could we have web site addresses included in the notes so we can obtain more information.

John Sherrell - In 2003, the fob coal price was \$28 per tonne. What will happen if and when the coal price returns to a similar level?

Wayne – The market is obviously an important factor. The rapid rise in the exchange rate has impacted the economy. That can turn around overnight as can the coal price.

John – Legislation changes much more slowly than coal prices.