COAL AND GAS OUTBURST COMMITTEE

HALF DAY SEMINAR – Wollongong 27th June, 2019

Contents

A Review of Coal Bursts

Winton Gale, SCT

Questions and Discussion

Brad Elvy - Regarding seismic energy release, did you consider man-induced energy such as by shotfiring or other procedures rather than just natural energy release? It is possible to get 300 to 600 MJ energy release over about 160 seconds from these.

Winton – No I did not take that into account. You should be in control of that type of energy release.

Energy Release and Failure Model of Coal Samples

Xicchan Yang and Lilai Tan for Ting Ren, University of Wollongong

Questions and Discussion

Ian Gray, Sigra – What is the mechanism by which the water is changing the behaviour of the test samples?

Xiaohan Yang – It has two effects. One is to reduce the strength and energy scale of the coal hence to mitigate the burst scale. The water enters the pores of the coal and reduces the strength. Another is changing coal properties. Coal will be more plastic with water infusion and more energy will be plastically dissipated.

Ian – So you are looking at effective stress processes?

Xiaochan Yang – Yes. We can see from the numerical modelling strength has been decreased.

Ian – What is the model based on?

Lilai Tan - Model is based on the experiments. We also want the experiments to be supported by the numerical model. We have just done some experiments using water infusion of coal and compared the results with the numerical modelling.

Xiaohan Yang –There is a change in strength with the infusion of water. The model is based on our test results.

Ian – So you are saying that if pore pressure is increased slowly, it can dissipate? A coal burst is a quick load process, so with infusion, you might reduce the strength, but there might be other ways of looking at it.

Lilai Tan - Before water infusion failure is very sharp and after infusion it is very simple. We believe that elastic energy will be more important in future.

Brad Elvy, - Will water infusion reduce the risks of coal bursts? It has been used overseas.

Xiaohan Yang – Yes, the water infusion is feasible for coal burst mitigation according to international experience and our research result. Poland, Germany and China have cases about water infusion for coal burst controlling. But the water infusion time is very important. As shown in numerical modelling, the best time for numerical modelling is when the stress is no more than 60% of the strength. In China, there is a 1000m depth coal seam under a sandstone with rich water. The water come down to increase the coal burst risk as coal is stressed and tend to fail with the influence of water.

Hydrofraccing in Block Caves

John Stacpoole, NSW Planning and Environment

Questions and Discussion

Editor's Note: These notes not edited by presenter.

Graham Prior - You said that the block cave was self-propagating; is there a way to stop it?

John – No. Most of the blockades (or caves?) come through to the surface. Some of the supplemental caves in Australia have propagated further than expected and some of those have come through to the surface. It is usual to have a subsidence plan in effect, but there are many unknowns. Some of the geology is not well understood and neither is the caving propagation. The subsidence model is updated about half way through and by the time the subsidence breaks through to the surface, the model is generally accurate to within a few months. Generally the holes that appear at the surface are rarely more than a couple of hundred metres different from the model prediction. Sometimes we have a situation where the cave does not propagate. Prediction of the path of propagation has come a long way. If we move the draws we can modify the path of propagation. We have now got to the stage of being able to drill and log enough holes and map the propagation. On comparison of the model and actual, we can try to modify the propagation. But propagation is a little out of control once it starts.

Anon – In some coal mines in NSW (Ed. I assume in Hunter Valley) the roof is sandstone with some solid conglomerates. The sandstones hang up in places over the longwall. Would the techniques you discussed by applicable to monitor these situations?

John - The method was initially focussed on preconditioning, based not on science but on common sense and the need to destress. Now it is measure, adjust and precondition with a target. I have seen it become an art and that can only happen if enough geophones are installed and the data from these are used to adjust the model.

Anon – How are they finding the target zones? Is it the geophones that locate them and how are the data mobilised to help mining?

John – The fact that propagation was being measured help to find the targets has helped mining a lot. If we had not needed geophones to monitor propagation, we would be looking at rock bursts as a phenomenon in a unit or seam. Because the geophones were in place, we had the ability to monitor the formation of trends of seismicity within the unit. The geology is complex so the targets are complex. The geophones are positioned so the mine can monitor the propagation, but now extra geophones are located to monitor individual targets.

Dendrobium Gas Drainage

Alaster Wylie, Erin Lee and Wayne Green

Questions and Discussion

Editor's Note: These notes not edited by presenters.

Anon – How do you intend to get more data for your thresholds for the Wongawilli seam?

Alaster – I think Cordeaux did try to drift down to the Wongawilli seam, but they were gassed out. Appin also put in a drift to the Wongawilli seam, but nobody has really tackled the problems of gas and outbursts in the Wongawilli seam. To get more data for our situation, we will need to take more core samples. But there is little history in the Wongawilli seam.

Tyler Stephen, Peabody – Will you have any opportunity for surface to in-seam drilling?

Alaster – It is very difficult to get approval for access by a drilling rig. The surface is water catchment area.

Wombo Underground Outburst Management

Peter Jandzio , Planning and Gas Drainage Superintendent

Questions and Discussion

Graham Prior, - You mentioned "early access" in regard to the exploration holes. What did you mean?

Peter – I try to get a drill into an area I need to drill as soon as the miner passes the proposed drill site. We try to get some indication of what the miner is heading towards. The earlier I can get the data the earlier I can give forecasts and schedule any remediation.

Ian Gray, Sigra – We hear a lot about gas thresholds which were developed essentially for the Bulli seam. It was believed at the time that CO2 caused more outbursts than did CH4. We now know that is not the case and there should not be different thresholds for the different gases in the same seam. Then we have DRI which is a measurement which is taken off Q3 from quick crush. It is a second hand measurement which is really the last thing that should be used. There are so many more factors that influence whether coal will burst or not, such as coal strength, toughness, structure, yet we keep hearing a return to DRI which is a simple cook book technique without foundation. We could probably save the industry a lot of trouble to lose it and to use what is sensible. Jeff Wood and I wrote a substantial report for ACARP in 2015 about what the various outburst factors were and the risks associated. I encourage you to look at it again.

Peter – I will take your comments on board. The DRI is included in our regulations and we must therefore use it. As simple as that.

Ian – I understand your position, but the Inspectorate are also here and needed to hear my comments. We are looking at going down our own path and looking at what might be more sensitive and relevant.

Michael Berry – But again that is part of legislation and it is what sites must use to manage outburst risk. (Ed. Note: I am sure Michael's comments were important and relevant, but he did not use the microphone, so I was not able to record his comments.)

Ian Gray – Someone can say something works and then it gets legislated. Then the industry is stuck with nonsense.

Michael Berry – I agree with you, but if the legislation says we must do something, we have to stick with it.

Tyler Stephen – How do you find ash correction impacts the results with the number of plies in the seam?

Peter – We correct back based on relative density of the plies to a 1.35 basis. Generally the sample and correction has not impacted the result greatly, there have been a few instances where the RD has been elevated and impacted a sample. In these instances we take a resample to ensure we have more coal.

Request on behalf of the Outburst Seminar Committee – Alan Phillips

The members of the Outburst Seminar are mainly retired and are no longer involved daily in the Industry. It is time to introduce new blood and experience into the committee. This is a call to people from each mine actively involved in outburst and/or gas management, in NSW and Queensland to nominate a representative to the committee. Distance will not be a problem in these days of digital communication.

Editor's comment: The Outburst Seminar Committee was set up after the 1995 International Symposium, to continue the dissemination of information about outburst and gas management and to promote discussion. Most of the current committee members were on the planning committee for the 1995 symposium. Two seminars have been run each year since 1995 and attendances are growing.

I personally gained a lot of knowledge from participating in committees looking into gas and outburst management over many years from 1980 and this participation helped advance my career. I saw many young engineers and geologists advance their careers through participation in ACARP sponsored Gas and Outburst workshops from 1993 to around 2010 when they freely shared their knowledge and experiences with their peers and they claimed that they solved more of their mine's problems in a day at a workshop than they could at the mine. I am sure there are many people in today's mines who could contribute and gain from contribution. Management could encourage young professionals in the industry to participate by nominating for the committee.

John Hanes