

Comments Following Peter Wynne's Presentation on Adjusting Gas Content Threshold Levels at Tahmoor Colliery

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Peter's presentation concluded with the question of having adjusted the thresholds at Tahmoor Colliery (effectively raising the thresholds), can this approach be more broadly applied to other Bulli seam mines. The question is a good one, and not just for Bulli seam mines. What happens in the Bulli seam influences approaches used in other seams (Wongawilli) and nation-wide. The implications are broad.

What follows is a personal view only, as an aid to debate on this important topic.

Structured and Unstructured Coal

In unstructured coal, gas content thresholds can be much higher, and in Tahmoor's case, it was quite appropriate to do in the totally unstructured, hard to drain areas. Determining that a coal is unstructured as a trigger for applying higher thresholds is a subjective decision, i.e. a soft barrier, so the process of arriving at such a conclusion requires considerable care. In the great majority of cases (probably > 95%), coal that will outburst is difficult to drill and difficult to core and providing interpretation and reporting is sound, outburst proneness should be quite self evident. In my experience at Tahmoor, this was always the case.

That view was shaken following outbursts elsewhere, occurring on intersecting strike slip faults. The intersection created a pod of mylonite sufficient to outburst, but a small drilling target:

- An outburst at Metropolitan Colliery where the deputy only just managed to retreat out of the CO₂ produced. Subsequent drilling showed quite benign conditions and low gas flow with no ability to identify the outburst zone. The gas content was above threshold in the subsequent test holes.
- The 1994 fatality at West Cliff Colliery. Drilling at the time was not directional and had not penetrated the outburst site. (I have no idea on whether follow up drilling was benign or not).

When rating an area as structure free, considerable effort needs to take place in terms of close spaced (say down to 2 m) drilling and correct interpretation.

Tahmoor's intermediate threshold allows mining to take place in structured coal provided the advance rate is below 12 m/day. I doubt that would hold up if applied elsewhere. Faces can stand for a long time only to outburst on resumption of mining. The gas simply bleeds off so slowly in coal about to outburst, that any advance rate is too fast. Probably the best contrary example to cite is the 1954 outburst at Collinsville State Mine. For the Bulli seam generally, this can be tested by reviewing

past records of mining leading up to outbursts. The notion of increasing the gas content threshold in structured coal via a slower advance rate I believe is potentially seriously flawed, and with great respect to Ripu and his work, it none-the-less requires re-confirmation - for the Bulli seam and elsewhere.

Gas Content Compliance Testing - Reproducibility

Gas content thresholds fundamentally imply that gas content testing is never varying. If Lab A and Lab B both develop their own fast desorption methods in compliance with gas content standard AS3980-1999, I am almost certain the result will not be comparable, with systematic differences of probably 1~2 m³/t . On the South coast, BHP and GeoGAS undertake compliance gas content testing. It is quite fundamental that comprehensive tests of reproducibility between these labs be undertaken. What has happened to date (to my knowledge) is nowhere near sufficient. I'd strongly suggest that the persons in charge of compliance testing in each mine take duplicate samples (just half the core) and forward one to each laboratory. The laboratory who normally does the testing needn't know the added significance in this case. Such tests may have already been done and if so they should be made public, subsequent to the mines coordinating results between themselves.

Tahmoor Colliery has an inherently lower gas desorption rate than other Bulli seam mines (based on GeoGAS DRI) i.e. the mine is inherently less outburst prone at the same level of gas content. In 2000, a submission was made to the department to have thresholds raised by 0.6 m³/t, bringing Tahmoor's threshold to the equivalent of the other Bulli seam mines in terms of DRI. Although a modest rise, it was none-the-less operationally significant. The application was rejected and Tahmoor proceeded on the course covered in Peter's presentation.

Just say (for example) that a mine is looking to apply Tahmoor's current thresholds. It needs to take into account Tahmoor's lower desorption rate plus any systematic difference in gas content between the laboratory Tahmoor uses (GeoGAS) and it's testing laboratory. So to be comparable to Tahmoor, a coastal Bulli seam mine would need to reduce its threshold by 0.6 m³/t on desorption rate then by whatever the difference is between laboratories. Suppose GeoGAS was consistently 1.4 m³/t higher than BHP's laboratory. To be comparable with Tahmoor, it would need to discount its threshold by 2 m³/t (in this example).

Gas Drainage Effectiveness

The driver toward increasing gas content thresholds has been definition of areas that are genuinely undrainable, totally unstructured and pose no outburst risk. Outburst prone coal, and particularly CO₂ coal is also hard to drain and clearly the distinction needs to be made. The worst scenario is that gas drainage is ineffective, not so much for reasons of mother nature as for reasons of inadequate design, implementation, monitoring and maintenance.

There are sound basic principles that must be applied and in no way should gas content thresholds be raised in response to poor drainage application. The basics are well known and are:

- Keep holes open
- Keep holes clear of water at all times
- Keep hoses/pipe ranges clear of water at all times.

- Monitor and chart the progress of gas drainage. Know well in advance that an area requires remedial work.
- Iterate on design

CO₂ in particular, with its very low gas desorption pressure (relative to CH₄) is highly prone to any back pressure in the system. Permeability is low enough as it is, but to have water lying in down dip holes just kills the relative permeability to gas.

Given the long history of gas drainage on the South Coast, one would think that gas drainage would now be finely tuned with high efficiency. I am not so confident and would like to see that proven for each mine.

Final Remarks

Fundamental in raising the gas content threshold is not increasing risk to people in any way. In unstructured coal an increase along the lines of Tahmoor is fine provided the lack of structure can be assured to a very high degree of certainty (eg 99.99%). Raising the threshold in structured coal on the basis of slow advance rate needs to be researched before it is widely applied. I suspect it will be proven flawed.

Reproducibility of gas content testing between laboratories is needed, the outcomes to be factored into considerations for threshold changes.

There is no doubt that great strides have been made in outburst prevention since the advent of systematic gas drainage and compliance testing. Changes to thresholds can be validly made but need broad debate, not the least because such changes have ramifications way beyond the Bulli seam.

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