QUEENSLAND COAL MINING BOARD OF INQUIRY

Coal Mining Safety and Health Act 1999

Establishment of a Board of Inquiry Notice (No 01) 2020

Before:

Mr Terry Martin SC,
Chairperson and Board Member

Mr Andrew Clough,
Board Member

At Court 17, Brisbane Magistrates Court
363 George Street, Brisbane QLD

On Monday, 15 March 2021 at 10am
(Day 17)

Transcript produced by Epiq

THE CHAIRPERSON: Yes, Ms O'Gorman.

MS O'GORMAN: Good morning, Mr Martin. The first witness this morning is Marty Denham, an electrical fire investigator.

THE CHAIRPERSON: Yes, thank you.

MS O'GORMAN: I call Marty Denham.

<MARTY DENHAM, sworn: **[10.01am]**

<EXAMINATION BY MS O'GORMAN:

MS O'GORMAN: Q. Your full name is Marty Denham?
A. That's right, full name is Martin, but I go by Marty.

Q. Thank you. You're the managing director of QEC Global?
A. That's right.

Q. Just in terms of your qualifications, it's the case that in 1987 you became a licensed electrical fitter and mechanic?
A. That's right.

Q. And in 1991 you became a certified electrical inspector with the Department of Mines and Energy?
A. Yes.

Q. In 1997 you obtained your diploma in fire scene examination?
A. Yes.

Q. And in 1998 you obtained a diploma in electrical engineering?
A. Yes.

Q. In all, you've had some 36 years' experience in the electrical safety industry?
A. That's right.

Q. And 20 of those years of experience have been in your current position, that is, as the managing director of QEC Global?
A. Yes.

Q. In your day-to-day work, you're routinely engaged in the testing and compliance assessment of all types of electrical appliances and electrical installations?
A. Yes.

Q. And you routinely provide professional advice, guidance and assistance to manufacturers, retailers, test laboratories and government departments on matters relating to safety requirements of electrical items?
A. That's right.

Q. In respect of this matter, you're aware that a number of items, electrical items, were taken from the Grosvenor mine on a date after 6 May 2020 and transported to Simtars?
A. That's right.

Q. Testing of those electrical items was undertaken by a team of people, including Inspector Neville Atkinson?
A. That's right, yes.

Q. You were tasked with attending at Simtars on 4 June 2020 to oversee part of at least that electrical testing process?
A. Yes.

Q. And you saw electrical items which were identified to you by various people, including Neville Atkinson?
A. That's right.

Q. Who explained to you the purpose of those electrical items and how they were used in an underground setting?
A. Yes.

Q. You saw the various testing which was done on each of the items there on 4 June?
A. Yes.

Q. Overall, according to your report, you were satisfied that the testing which was done of those items was appropriate?
A. That's right.

Q. And that the testing was apt to find, if there was one to be found, any faults with the equipment which was being analysed?
A. Yes, that's my view.

Q. Ultimately you formed the view that there was no evidence to suggest that the cause of the ignition at Grosvenor mine on 6 May 2020 was due to an electrical fault in any of those items?
A. That's right.

Q. Briefly by way of follow-up, you were asked to return to Simtars on 17 June 2020?
A. Yes.

Q. And that was because there was one item which had been identified as being of some interest to the team that Neville Atkinson was part of and he wanted your opinion as to whether or not that particular item could have been the cause of the ignition?
A. That's right.

Q. You reviewed that item and satisfied yourself that there was no evidence that it could have been the cause of the ignition?
A. Correct.

Q. So overall, as a result of your involvement in the observation of the testing processes and the observations that you yourself made, you found no evidence at all that the ignition was caused by an electrical fault in the items that you viewed?
A. Yes.

MS O'GORMAN: Those are all of the questions that I have, thank you, Mr Martin.

THE CHAIRPERSON: Thank you. Mr Holt.

MR HOLT: We haven't sought leave.

THE CHAIRPERSON: Mr Crawshaw?

MR CRAWSHAW: No questions, Mr Chair.

THE CHAIRPERSON: Ms Grant?

MS GRANT: No questions, Mr Martin.

THE CHAIRPERSON: Mr Trost?

MR TROST: No questions, Mr Martin.

THE CHAIRPERSON: Mr O'Brien?

MR O'BRIEN: No questions.

THE CHAIRPERSON: Mr Dollar?

MR DOLLAR: No questions.

THE CHAIRPERSON: Ms O'Gorman, are you happy for Mr Denham to be excused?

MS O'GORMAN: Yes, thank you, Mr Martin.

THE CHAIRPERSON: Mr Denham, thank you for your attendance. You are excused.

<THE WITNESS WITHDREW

THE CHAIRPERSON: Yes, Mr Rice?

MR RICE: Mr Martin, I call Rob Thomas.

<ROB THOMAS, affirmed: [10.08am]

<EXAMINATION BY MR RICE:

MR RICE: Q. Is your name Rob Thomas?
A. Yes.

Q. Mr Thomas, are you a geotechnical engineer by occupation?
A. Correct, yes.

Q. You were educated, I think, in the United Kingdom?
A. Yes.

Q. Tertiary educated?
A. Yes, yes.

Q. Including Doctor of Philosophy in rock mechanics?
A. Correct.

Q. Also a Bachelor of Science with honours in geology?
A. Yes.

Q. You came to Australia, what, about 1992?

A. 1993.

Q. And you've worked continuously in Australia since then?
A. Yes, yes.

Q. In the field of underground coal mining?
A. Primarily, yes.

Q. You presently are principal engineer and a director of a company called Strata2; am I right?
A. Correct, yes.

Q. Is that a form of consultancy to the coal mining industry?
A. Yes, yes.

Q. In your particular field --
A. Correct.

Q. -- of geotechnical engineering?
A. Yes, yes.

Q. Could you just explain for us in terms of geotechnical engineering science and skills what that can offer to the activity of underground coal mining?
A. Geotechnical engineering basically deals with how the rock mass responds to mining. We obviously want it to respond in a favourable way that we want it to behave. So we, as geotechnical engineers, work on various levels of control. The highest level would be the actual mine design, where the mine's located, how big the extraction should be, what direction was the extraction. That was all about trying to control the macro scale behaviour of the rock mass.

You can then go right down to the smaller-scale level where you're looking at how the rock actually performs in and around the tunnel, and there you're looking at - again, there can be mine design aspects there in terms of how you lay mine plans out, but it can also be how you use roof support.

Q. So the skills and science behind the skills of a person such as yourself are then relevant both to planning and design and also to production in a longwall?
A. Correct, yes.

Q. You were engaged, I think, by the coal mines inspectorate to assist with some aspects of its investigation of the Grosvenor incident?
A. Yes.

Q. You've prepared reports, have you not, dated November 2020 and February 2021?
A. Correct, yes.

Q. You've also prepared a PowerPoint to assist with some explanation of aspects of your report?
A. Correct, yes.

Q. I want to go directly to that and use that as a framework, as it were, to discuss certain aspects of your work. It may also be necessary from time to time to refer back to your report. I have a hard copy. Would that assist you to have that as an aid?
A. Can I use the hard copies I've got here?

Q. Feel free to use that if it helps you. We'll do this electronically, but it may assist to have a hard copy as well.
A. Yes, sure.

Q. Just so you know, Mr Thomas, I have control of the slides here, but you should have there in the witness box a pointing device, and it will likely be necessary from time to time for you to point to the screen and highlight certain things as you go. Okay?
A. Where is the --

Q. It's not on display yet, but it should come up on the screen in front of you when we get to it. In fact, we'll put it up now. The PowerPoint is document RSH.019.001.0188.

THE CHAIRPERSON: Q. Mr Thomas, you also have a screen in front of you there.
A. Yes.

MR RICE: Q. This is slide 2. Perhaps, if you wouldn't mind, just give us an overview of what function you were asked to perform by the inspectorate?
A. In this report, the focus of the report was to try and determine what geotechnical factors, if any, could be

associated with the methane ignition that occurred on longwall 104. Where appropriate as well, the second bullet point goes on to explain that were there any aspects of the geotechnical decision-making process and strata management process, which is more the operational side that you discussed earlier - could any of those also have had a material impact on the ignition.

Q. For that purpose, were you provided with a volume of documents and information by the coal mines inspectorate?
A. Yes, I was, yes.

Q. Which you understood to have been obtained by the inspectorate from Grosvenor coal mine?
A. Yes.

Q. You have made an assessment of that material for the purpose of this PowerPoint and also your report?
A. Yes.

Q. To begin with, your slide number 3 deals with some basic concepts, not so much mine specific to this point; am I right?
A. Correct, yes.

Q. Would you mind giving us an explanation of those depictions, starting with regular weighting?
A. Okay. Yes, look, as per your introduction, these sorts of schematics are illustrations of typical longwall geomechanical failure modes and some are much more common than others. The first example at the top is regular weighting, and fortunately in the vast majority of mines throughout the world, this is the most common failure mode.

Now, for those who don't understand much at all about longwall geomechanics, what you have in that cartoon, as I call it, is a longwall shield, which is the - that's the white piece of equipment that you can see there. Now, that doesn't actually cut the coal. There's a shearer that goes up and down like a bacon slicer which cuts the coal. The coalface, as you see it, moves progressively to the left. As it moves to the left, it's obviously leaving rock behind.

The rock above that shield they call power supports, longwall shields, longwall chocks - it's all the same thing. The rock above the shield as it moves to the left loses its support and effectively it caves behind the longwall shield. Now, that caved material in Australia is called goaf, and that is just a mishmash of fractured material. That is a favourable geomechanical outcome in the sense that the rock that you're trying to support fails and sits on the floor behind you, and you never have to support it again. On the right-hand side is periodic weighting.

Q. Just before you go to that, Mr Thomas, the activity of mining through the face drawn in black on that first diagram, that would create a void, would it not?
A. Yes.

Q. By the process of mining and extracting the coal?
A. Yes.

Q. And that leaves the rock above it essentially unsupported?
A. Yes, correct.

Q. So that produces, does it not, the activity of goafing?
A. Correct.

Q. Is that the scenario that's depicted in the first diagram?
A. Correct.

Q. And you would expect and hope that that would occur; is that right?
A. Yes. You --

Q. As a normal part of coal mining?
A. You want it to occur. You want it to fail behind you.

Q. Why is that?
A. Well, if it doesn't fail, you end up in a scenario that's on the top right-hand side, which is you end up having to support more and more rock, and effectively that rock ends up behaving like a cantilever and eventually that cantilever will start to rotate and weight upon the longwall face. So you purposefully want the rock to fail behind you and leave your problem behind, and you just march on and the thing is failing behind you.

So it is a normal process in coal mining to hear rock

Transcript produced by Epiq

behind those longwall shields caving and fracturing and making noise. That is a normal process, and it's a good outcome.

Q. To move, then, to the next depiction of periodic weighting, is that not a favourable outcome?
A. No, that's not a favourable outcome, and to explain how significant periodic weighting is, you would think - the layperson would think that a coal seam located at a depth of nominally 1,000 metres would experience more stress and more deformation than one located at, let's say, 200 or 300 metres, but it's not always the case.

Mines in Europe operating at depths of 800 to 1,000 metres can quite easily get away with 800, even down to 350 tonne longwall shields, because every metre they move, a metre of rock falls in behind them, so they never end up with the cantilever situation.

Q. That's the European experience?
A. That's the European experience, yes. When Australia went longwall mining in the mid to late '60s, it obviously bought longwall equipment from Europe, the UK or Germany. Now, longwall equipment that was, let's put it this way, happy at depths of 600 to 800 metres went to mines at 300 or so metres deep, and the longwall equipment got overstressed, failed, and the longwall extraction system was deemed quite quickly as a failure.

The key difference between Australian geology and most European geology is that we have - and it's not common, but we do have thick competent units of strata located in close proximity to the coal seam. We call it the near-seam overburden.

Now, those units don't like failing and when they do fail, they tend to fail as big lumps or they fail as cantilevers. I will explain this in a little bit more detail, but the simplest way I can explain what happens when a cantilever starts to move, which is what I'm trying to show there, where if you can see on that diagram what is the large light-brown coloured unit - you can see it's got a crack to the left-hand side of it.

I don't know whether this pointer works. Anyway, the crack that you see - oh, direct it at the screen. That's good. That crack there is basically symptomatic of that cantilever failing. And as it fails, it rotates on to the longwall face.

Just imagine that as the cantilever starts to rotate, the longwall face and the coalface itself is effectively a nut in a nutcracker, so you've got this huge lever arm pressing down on the longwall face, which breaks up the coalface.

Q. Is that capable of damaging the shields?
A. Yes. Very much so.

Q. Crushing the shields?
A. Very much so, yes.

Q. There's an expression I think "ironbound"?
A. Yes. Ironbound is where you've lost all hydraulic travel on the longwall shields.

Q. Could that be the outcome of an event such as that?
A. Correct, yes. It could, yes.

Q. What is its rarity?
A. Ironbound longwalls would be very, very rare. I couldn't put it - if I had to put a figure just for layman's terms, I would say much less than 0.1 per cent. It is very rare. In my 30-odd years of mining career, I've probably only ever seen two or three ironbound longwalls, but in terms of high-level periodic weighting where the longwall shields have undergone significant amounts of compression - and just to put this into perspective, there's one case in New South Wales where they use 1300, 1400 tonne capacity longwall shields. Compared to, say, the European standard of 350 to 800, that's a lot.

But this mine located at a depth of 200 to 300 metres, when they had a weighting event, and they had a lot, those 1300, 1400 tonne capacity shields, they would be compressed and effectively pile driven into the floor in a matter of seconds. So the tonnes that can be generated from a cantilever failure are way beyond what man can support.

Q. And periodic weighting, can you comment on the frequency of that occurrence?
A. There's actually two levels of periodic weighting. There will be low-level periodic weighting, which I would say, just for illustrative purposes, I think low-level

periodic weighting, 50 to 60 per cent of the mines, maybe more, of the country would have that where you have these periodic increases in load on the longwall face, and that is of no consequence to the operation really of any great concern.

I would say that again 10, 20 per cent of mines would have what we would call high-level periodic weighting. The difference between low- and high-level periodic weighting is subjective. High-level periodic weighting for the purpose of this discussion would be where the closure event has induced some level of unwanted outcome on the face, be it a significant convergence event, be it a roof fall in front of the shields, be it the face spalling or breaking up in front of you.

Q. Can you move, then, to block detachment and we'll take airblast last.
A. Yes. Block detachment is again a very rare failure mechanism. In terms of probability, it's probably in the realms of ironbound longwalls, very, very rare events. Basically what that is saying is - what I've tried to illustrate there, the vertical line with the two red arrows either side, let's call it a fault. That's a predefined weakness plane, and as you mine up to that fault, basically the superimposed stresses induce failure on that fault plane and the whole of that block that's located above the longwall shield effectively sits on the shield. There is no bridging ability.

You can see, if you go back to the top left-hand side, regular weighting, immediately above the longwall shields there is some form of bridging ability whereby some of the weight from that strata located above the shields is redistributed on to the longwall face and the shields, whereas in the case of block detachment it's all sitting on the shields.

Q. You've drawn the angle there virtually as vertical. Does block detachment only operate on a vertical fault, as it were, or can it be at some lesser angles?
A. It could be lesser angles, yes.

Q. That's also a rare event?
A. Yes, yes.

Q. The fourth concept is that of airblast. Can you give

Transcript produced by Epiq

us your explanation of the depiction there?
A. What an airblast is - you could look at this from the perspective of going from regular weighting to periodic weighting to airblast. All other things being equal, the rock mass above you is getting stronger and stronger. So with regular weighting, it's weak, it caves readily behind you. Periodic weighting, it hangs up for a moment in time, breaks, and then behaves as the proverbial nutcracker.

In the case of an airblast, there's various ways the airblast can manifest itself. What's illustrated there is an example where the rock mass as a whole doesn't behave as a cantilever. It hangs up virtually forever. What you see there is a large block of that material just failing and letting go and detaching on to the goaf pile below.

Now, in that case, as you can imagine, what that behaves like is like a bellows. That material, when it falls into the void between itself and the goaf pile, compresses and therefore expels the air away from itself, and by virtue of the path of least resistance most of that air, unfortunately, will go on to the longwall face where people are working.

Now, that is an airblast. You can get airblasts not as is illustrated there, which is an extreme example - you can get airblasts if you just have large periodic weighting units letting go as well.

Q. The cantilever hang-up which is depicted in the periodic weighting diagram is also applicable to the concept of airblast?
A. Yes. If for whatever reason through other contributing factors that cantilever has the ability to fail suddenly and detach on to effectively an air gap, you could end up with the same thing.

Q. You've referenced the New South Wales 2007 windblast guideline in your report.
A. Correct.

Q. It adopts a criterion for classification of windblast at a velocity of wind of 20 cubic metres a second?
A. 20 metres per second.

Q. 20 metres per second. What's the significance of that figure, can you explain?

A. I'm not confident on how accurate or absolutely relevant it is, because even the research project that mentions it says that it's almost a number for the - it's not a number for the sake of a number. It's almost - it is one possible number that you could calculate. I don't think people have physically tested the accuracy of 20 metres per second. But basically what the researcher did - and I'm not privy to the mathematics of it - was to say the velocity of a person in free fall under obviously a gravitational force, and the gravitational force is proportional to the mass of the person, that results in a velocity of 50 metres per second.

Now, out of that, the engineer concerned worked out that 15 per cent of the drag force is sufficient to knock a standing person not in a braced position over. Where that 15 per cent comes from I don't know, and how accurate it is I don't know, but nonetheless it is a number that people bandy about. 20 metres per second is the velocity that differentiates an airblast from a windblast.

Q. Being the velocity at which a person could be knocked off their feet?
A. Correct, yes.

Q. You're not convinced of its importance?
A. I'm not sure how rigorous the science behind it is. In other words, how much data has been collected to substantiate it. I'm not saying it's wrong. All I'm saying to you is these windblast events are pretty rare events. There wouldn't be a database of 100 case studies substantiating it. To me, it's a number. At the end of the day, what you're interested in is what velocity could knock someone over, and if it's 20 metres per second, it's 20 metres per second, to be honest with you.

Q. Tell me, let's assume the velocity is not up to 20 metres per second, it might be something less than that. Does that affect the geomechanics behind the phenomenon itself?
A. I would only say that if you compared an airblast outcome of, say, a nominal velocity of less than 20 metres per second against a full pure windblast of greater than 20 metres per second, you'd have to draw the logical conclusion that the latter would be as a result of a larger goaf fall.

From an operating perspective, that then draws into the issue of consequences. If you were a mine operator and you were faced with a windblast as opposed to an airblast problem, you've got something a lot more significant to deal with in terms of the quantity of air that can be expelled and what that could mean to the risk of ignitions, the risk of knocking people over.

Q. And causing injury?
A. Causing injury, yes.

Q. Displacing objects and so forth?
A. Correct. And you have a bigger concern --

Q. And causing injury in that fashion, potentially?
A. Correct, yes. Again, as a rough comparison, again these are not - these sort of numbers are just for illustrative purposes, but most mines would have some form of airblast, so air movement, and a lot of mines would have some form of airblast when they're starting the extraction, and that may well cause some movement of air which may well knock down some ventilation devices.

Q. Is that the first goafing concept?
A. That would be first goafing, yes. In terms of concern level, whilst it's not good, it's not anywhere near the potential consequence of a windblast, which - I mean, basically, if you read the New South Wales guidelines, it says if you've got a windblast problem, you've got to get rid of it.

Q. In your report, I don't need to go to the text of it, you did note, I think, at page 2 of it that in the information that you had at the time the report was written, you noted that it didn't knock over any of the operators.
A. Yes.

Q. I think since your report was written, you may have had access to more of the accounts of the workers who were part of the experience?
A. Correct, yes. Since the first report was written, I've read some of the testimonies from the operators that were on the longwall and in the maingate. My conclusion, without any, again, velocity measurements, is that it was clearly a windblast and therefore, from that, it was a significant goafing event.

Transcript produced by Epiq

Q. We won't get caught up on any distinction, real or otherwise, between airblast and windblast. For present purposes, we'll use those terms interchangeably. Okay?
A. Yes.

Q. Let's move to the next slide.
A. These next few slides tend to bore into some of the detail on the failure mechanisms that we need to understand before we start getting into the site-specific problem that is Grosvenor longwall 104. I will be repeating myself here somewhat, but just bear with me.

This is a typical sort of cantilever behaviour on a longwall face. I've broken this down into steps 1, 2 and 3. What we have here is the black being the coal seam, the grey being whatever weak rock immediately above the coal seam and above that is a 10, 20 metre thick unit of let's call it sandstone.

As that longwall face is mining progressively to the left of the screen, you see that the grey weaker material is failing and goafing behind the longwall shield.

Q. And under pressure from the unit above?
A. Yes, from the pressure of the unit above as it starts to move, and as a result of the fact that the longwall shields are moving and therefore taking away their support from that material, so that material has nowhere to go but to fall and hit the floor.

As you're retreating to the left, the sandstone unit, as is illustrated here, that doesn't want to fail. It's too competent. It's too massive. "Massive" is a term that we use to describe rock units that have very little to no bedding planes or weakness planes in them. It is one big lump of rock, for the want of a better term.

As you mine to the left, this unit doesn't want to break, and it starts to hang up. Now, there will come a point where that unit will start to generate excessive tensile stresses. As the unit starts to bend, those tensile stresses - if you could imagine the flexure of a beam, you will be generating tensile stresses on the upper surface and, in this case, compressive stresses on the lower surface. There will come a point where that lever arm will become so great that that cantilever will start to fail initially in tension and then it will start to fail in shear.

When it does that, the rotation speed, for want of a better term, of that cantilever will increase, and then that nutcracker analogy comes in place where that unit will start to, we use the term "rotate". It then starts to basically pivot off the coalface which is in effect a fulcrum, and it will end up compressing the coalface, including the longwall shields, and, in doing so, it will develop what I've illustrated there in step 3, is mining-induced fractures above the shields. That's a weighting event.

Q. Are the detachment and associated collapse capable of occurring suddenly?
A. Well, there's sudden and there's sudden, I guess. The mine I quoted from New South Wales that has high-level periodic weighting, when their cantilever starts to move, they would have seconds to minutes to do something about it. Not a lot of time.

Q. What could you do in that time frame?
A. Oh --

Q. Clear the decks?
A. Clear the decks, and there's certain pieces of mine equipment you can move to get away from where - to minimise damage to mine equipment. So we're talking seconds to minutes. There are cases, which are a lot rarer, where we're talking instantaneous, "woofta", it will come, it will move. That is much more rare.

Now, why the term "periodic weighting"? Because once that unit fails, eventually as you carry on mining, that unit will then tumble on into the goaf. Then the clock starts ticking again. You'll go through - the interesting thing with periodic weighting is that you go through - when the clock starts ticking, you go through like a honeymoon period of very low loading, almost anomalously low, and then when the lever arm starts building up, you start seeing compression on the face. When the lever arm starts to break, you start seeing failure on the face. That's akin to the cantilever failing. Then the clock starts again. Hence the term "periodic weighting".

Q. The schematic that you've drawn there is absent any

pre-defined weakness; am I right?
A. Correct.

Q. Let's go to the next slide, number 5. There are a number of diagrams there illustrating, once again, the concept of airblast. Perhaps you might just give us your description.
A. Yes, this schematic is boring in a bit more detail on to the airblast concept. Again, this is illustrating a massive significant unit that in its entirety does not want to fail and is able to span across the extraction panel. It's spanning from left to right across the page, basically.

What you see here is the underside of that unit displacing, in the second schematic, on to the goaf pile. As a result of that, you can see in those red arrows, they're pointing away from the longwall goaf, air is expelled into the workings.

The interesting thing there is that as a consequence of that failure, you create a vacuum, which is basically as a result of the differential in the pressure between what's in the vacuum and the mine workings, the air then will tend to, they call it a suck-back. It will end up effectively, as it says, getting sucked back into the longwall goaf. So a windblast is typically associated with an expulsion of air, and then as you create the vacuum, the pressure differential basically, as it says, sucks back the air.

Q. That must be immediate, presumably, by virtue of the existence of a vacuum?
A. Yes, yes.

Q. Is the suck-back at the same velocity typically?
A. I think it's slightly less. I think it's slightly less, yes.

Q. Speaking of velocity, is the velocity of a windblast a function of the size of the material that's collapsed; in other words, the more material that's collapsed, the bigger the windblast?
A. Yes, logic would say that the bigger the airblast event, the bigger the goaf fall. As geotech engineers, we have a limited control on our knowledge on rock mass properties. Okay? We've even less when it comes to a longwall goaf.

The reason why I'm saying that is there are other factors that affect the magnitude of a windblast. As an off-the-cuff statement, it's fair to say that the bigger the event, the bigger the goaf fall, but there are other factors that can affect the magnitude of an airblast: the way the material falls, does it fall as a planar piston; the number of vents, number of areas where the expelling air can vent itself. There's probably more.

Q. Is the size of the void above the goaf material relevant?
A. I would imagine so, yes. The distance it has to fall, that would be a significant player. And we have very little control - knowledge, I should say, on what that looks like.

Q. By the way, once again for this schematic, you've drawn a whole block detachment, but I think you did make the point earlier that the cantilever scenario is equally applicable to the occurrence of windblast?
A. Correct, yes.

Q. Okay, thank you. Could I just take you to a part of your report. Mr Operator, are we able to go to a different document? The number is TRO.001.001.0001. I'd like to go to page 7, .0007, and the bottom dot point, Mr Operator, if you could highlight that.

At that point of your report internally numbered as page 5 you've identified what you describe as the key geotechnical factors associated with airblasts. The first of them is thick and competent rock types. Is there a measure of thickness and competence, or is it subjective? Is there some objective measure of what a thick and competent rock type is?
A. I think - the answer is yes and no. Look, in terms of - there isn't a definitive agreed standard that all geotechnical engineers in this country and the world would agree, but I think there are numbers that most geotech engineers would deem as reasonable and that you would on a case-by-case basis, with site-specific knowledge, have some latitude to think outside and around those numbers.

I will give you an example. The New South Wales guidelines on windblast say that a competent massive unit is 10 metres or more in thickness, but it also says thinner units can cause windblasts. That's geotechnical engineering for you. Okay?

Q. Is it the bottom line that you need something that's big and strong, a rock mass that's big and strong?
A. You need a big, strong unit that has the ability to fall into an air gap and, as a result, expel the goaf gases.

Q. You refer in that passage to the near-seam overburden. Is there a distance above the seam beyond which these features cease to be relevant?
A. In the concept of windblast, generally - this is again a rule that some people view as cast in stone, but it's actually based on a limited experience in the Newcastle coal field in New South Wales, that if the thickness of the interburden is less - and the interburden is the distance between the extraction horizon, the roof of the extraction horizon and the base of the span unit - if that interburden is less than two times the extraction height and you have a spanning unit, you are at risk of a windblast.

Now, that's based on some experience from two, maybe three, mines in Newcastle. Like a lot of things in geotechnical engineering, it's not quite as simple as that. Basically all you need is an air gap which would - and a competent unit that can span instantaneously and then fall into that air gap. That air gap could be several metres high up above the goaf, above the floor. We don't really know.

Q. The second point you've made there is the limited thickness of interburden. Is that the formula that you described?
A. That's the rule of thumb from Newcastle, yes. I'm not sure I answered your question on near-seam overburden. That again is a subjective comment, but from my perspective, we generally would say we would be interested in rock types from the perspective of periodic weighting, not windblast.

From the perspective of periodic weighting, where there is a bigger database, we're interested in any unit that's located certainly 60 and maybe up to 80 metres away from the extraction horizon, but that's specific for periodic weighting, where it's a much more common phenomenon and we have a much larger database. So we use

80 metres to define - this is my company, basically - near-seam overburden.

Q. Up to 80 metres?
A. Up to 80 metres. That's in the concept of periodic weighting. Other people may have different numbers.

Q. If we're not talking, in the case of the Grosvenor incident, about a periodic weighting event, does that 80 metre limit have application or any relevance?
A. To what, sorry?

Q. To the Grosvenor event, which I think you accepted - correct me if I'm wrong - was not an incident of a periodic weighting event but, rather, an airblast scenario?
A. If - without wanting to go into detail, I would say, to answer this question, I would be interested in Grosvenor or any other mine in the country, from the perspective of periodic weighting, in any rock types within 80 metres of the extraction horizon. I would - I wouldn't be afraid to go to 100, but certainly 80, and that would be the limit of my horizon where I would cease to be concerned that those potential big units could have an impact on this longwall face.

Q. Can we then apply that rule of thumb to the Grosvenor incident?
A. Well, the answer's yes and no. The answer is yes in the context that we should be interested in potential competent units located within that horizon, because those units could cause some level of periodic weighting. Again, there's periodic weighting and there's periodic weighting. Okay? But in the context of windblast, the higher up that unit is, the lower the likelihood you're going to get a windblast, because there's a concept that is mentioned in this report called bulking, the bulking factor.

For those who don't know, bulking factor is basically a ratio of the fractured material compared to the intact material. Obviously fractured material contains solid material and air gaps. When rock fractures, it volumetrically expands, so it's just a simple ratio of one over the other. The higher up that spanning unit is, the greater the likelihood that that bulked-up failed material below it is going to fill that void and you won't have an air gap.

What's the magic number? I don't really know. You would have to look at relevant empiricism from your mine or neighbouring mines in the same seam to come up with that number.

Q. Let's go back to the PowerPoint, if we can. Go to the next slide. You turn to the subject of faults, distinguishing between favourable angles and unfavourable angles. Could you explain?
A. Yes. This is in the context of block detachment, you could argue, and general ground control on a longwall face. Dealing with the first one, which is the one that you saw on a previous slide, which is block detachment - and again what block detachment is, that is basically saying the rock that's immediately above the shields has no spanning ability, it can't redistribute load on to the coalface in front of you and that if or when it fails on that weak plane, that is a fault, and for those who don't know, a fault is a geological or naturally induced displacement in strata. It's a pre-defined plane of weakness, if you want to call it that. In this situation, the rock will slip on that fault plane and effectively sit on the longwall shields, and depending on how it fractures, it can again result in an ironbound longwall face.

Now, in the case of the significance of the angle of intersection, that's significant from the point of view of if you've got a high angle of intersection, as in the top drawing, the rock on either side of the fault plane can bridge and effectively it is less likely to detach as one big mass parallel to the longwall face.

Also, with a higher angle of intersection, the fault affects less metres of the face. So all in all, the shallow angle of intersection increases that a block could slip en masse and affect tens of metres of the longwall face in one hit. As a rule of thumb, a shallow, unfavourable angle of intersection is at or around somewhat less than 20 degrees. Then people start getting concerned.

Q. Block detachment is one of the risks associated with a high angle?
A. Yes.

Q. You mentioned also in the bottom diagram that there is an increased risk of face spall. Perhaps you might just explain firstly what "face spall" is?

A. Either through simple overburden pressure, which is the rock up to the surface, or through the cantilever in action, which again is that nut and nutcracker-type analogy, that weight will redistribute itself on to the coalface as well as the longwall shields.

If you overstress the coalface, it will deform and break down and effectively detach as various sized blocks on to the longwall face. That's called spall.

Q. We're talking about blocks detaching from the coalface --
A. From the coalface.

Q. -- other than through the action of the shearer.
A. Yes, other than through the action of the shearer. These blocks - what that face spall does is it's obviously creating a larger and larger span that you have to support with your longwall shields, and the significance of that increase in span is probably primarily due to the fact that it's increasing the likelihood - between the longwall shields and the coalface, there's no support. The shield is the end of the support. Between that longwall shield and the coalface, there's no man-made support there. The longer you make that, classic beam theory says the greater the likelihood you will have a fall or a cavity. You don't want falls or cavities ahead of the longwall shields. So the consequence of face spall, the main consequence of face spall, is roof falls in front of the longwall shields.

Q. Is this introducing the concept of tip to face distance?
A. Yes. Yes.

Q. Perhaps you might now take the opportunity to explain what tip to face is?
A. Yes. Tip to face is effectively the distance between the end of the longwall shield, the canopy, and the cut coalface. Now, that is predetermined through the design of your longwall equipment, on how you set the longwall shields up, how much you cut when you extract the longwall face.

Q. Is there a set normal distance, if I can use the word "normal", for the tip to face at Grosvenor?
A. From memory, I think before the cut, which is before the shearer came in, it was around 850mm or thereabouts,

Transcript produced by Epiq

something like that.

Q. If that distance increases to a metre, perhaps 2 metres, what does that indicate?
A. It can indicate one of two things, or even both. The first one is that obviously there's an increase in stress through simple overburden depth or through cantilever in action. It could well be that the stress hasn't increased at all; it's just that the coalface is inherently weaker because it's been disturbed by some form of geological disturbance. You could get both, so you could have an increase in weighting on the face and a weaker coalface.

Q. Does an increase in the tip to face distance carry with it a risk of rock fall in front of the face, that is to say, between the face and the shields?
A. Yes, yes.

Q. We might come back to that a bit more later when we look at some specific diagrams. Perhaps we could move on to slide 7. We're starting to get to some mine-specific information; am I right? These are three representations. Do they derive from mine records, or have you created them?
A. No, they've all been copied from mine records.

Q. The first one simply indicates a contour of the depth of mining of the various longwalls?
A. Correct, yes.

Q. I think it's accepted that mining was being carried out at longwall 104 at about 390 metres?
A. Correct, yes.

Q. I think you may have said earlier that depth of mining is not necessarily of any particular significance in a geotechnical sense.
A. No, I think on a longwall - look, you'd always want shallower as opposed to deeper. Given the choice of 100 or 1,000 metres, you'd take 100 any day, but I would say from a longwall geomechanical sense it is not a big-ticket item. The big-ticket item is competent sandstone units in the near-seam overburden and what that can do in terms of periodic weighting and windblast.

Q. Your next representation is of seam thickness. What relevance does that have?
A. I think in the context of this assessment, it's very

Transcript produced by Epiq

much secondary. It was more for just setting the scene. Basically what it is, it shows there, there's a rider seam, which is a thin seam that lifts off and I think it comes back down. Where it lifts off in that red area is where the seam obviously - the main seam gets thinner, then it comes back down. It's very much of secondary relevance to this assessment.

Q. Okay, we won't dwell on it. The third representation indicates that there were various domains of mining.
A. Yes.

Q. And that the mined area of longwall 104 was in a domain B deep. Is that of any significance? Perhaps I should ask this: what are the features, are you able to say, of domain B deep so far as mining is concerned?
A. Ironically, domain B deep was regarded by the mine site as being the most favourable geotechnical environment.

Q. For what reason?
A. The mine's focus in terms of longwall geomechanics, and I dare say this probably - it may well transcend into gateroad control, but certainly in longwall geomechanics, the mine's focus was on immediate roof control. That's another subjective call, what is the immediate roof, but is the roof 2 or 3 metres above the coal seam, just the near stuff. And because the coal seam is thicker there and cleaner there, has less clay and mud bands in it, it's a better immediate roof.

Now, why is coal a good roof? Well, compared to stone, certainly stone in this mine where the stone above the coal seam, immediately above the coal seam, is very weak - coal is a very ductile material. It can take some degree of punishment and it won't fall in. It is a common control in Australia that if you have a weak stone roof above the coal seam, you leave some coal behind. Obviously for a multitude of reasons, you don't want to leave coal behind unless you have to, but a lot of mines do leave coal behind to control the immediate roof because you don't want it falling out in front of the shields.

Q. That's what they were doing at Grosvenor?
A. Yes. I think the nominal minimum target was 600mm, which is a reasonable number based on my experience. For that reason and the fact that one of the stone units, I think it's roof unit 2 - yes, roof unit 2 got thinner.

So you've got - this is in terms of immediate roof, you've got roofing at 1, which is basically the coal seam, the top coal. Actually, in some parts of the mine that's dirty and clay bands and is weak. In the inbye end, which is where we're at, it's thick and clean, which from a geomechanical perspective is good. Above that, you have this muddy, silty sequence which is a metre or so thick, and that is very weak.

Where we're at, where this incident occurred, from memory, that gets thinner, which is good. Then you get roof unit 2 - 3, which is a bit more of a coarser and stronger horizon.

Q. These expressions roof units 1, 2 and 3 can be related to various of the mine documents describing the immediate overburden?
A. Yes, yes, yes.

Q. So they're not your terms. They're terms that come from the mine's terminology?
A. Yes. So the only takeaway point we've got here, and I personally think it's very much a secondary factor, is that from the perspective of immediate roof control, they deemed that this was the best out of the three domains that you can see there - I mean, there's four, but the three main domains.

Q. Moving to slide number 8, you've entitled that "Mapped and Inferred Dom and Fooey Faults". What do you mean by "mapped and inferred"?
A. Mapped is what they physically observed in the gateroads, the tunnel, so to speak, around the extraction, and inferred would be their extrapolations into the longwall block.

Q. So the diagram that's depicted there, just to be clear, is that a mine document or is it of your creation?
A. That's a mine document.

Q. What would be the purpose of it, do you know?
A. Why did the mine develop such a document?

Q. Yes.
A. Well, I think it was - I can only infer that the mine would have developed it to give the longwall team, for want of a better term, some idea of what in terms of geological

structure was in front of them.

Q. You'd probably want to know where your faults are likely to be?
A. Yes.

Q. So as to anticipate them; am I right?
A. Yes. And, look, faults are never good, but they can be bad, and they can be very bad. All that depends on a whole host of things, one of which we described as its angle of orientation to the face. The others could be the type of fault, the type of strata surrounding the fault, all these things would be part and parcel of something like this, I'd imagine.

Q. So far as the Fooey fault is concerned, we see at different parts of the diagram it is noted as a 2.4 metre, 2.5 metre fault. In practice, I think it turned out to be somewhat bigger than that; is that correct?
A. It was mapped at 4 metres somewhere in the middle of the longwall block, and seismic and exploration drilling in the neighbouring longwall 103 I think identified it as being nominally 3.5, 3.6 metres, something like that. So it's a fault with a variable - it's not a consistent fault.

Q. At any rate, does this diagram tell us, then, that prior to mining, the mine was aware of the existence and something of the dimensions of the Fooey fault and the Dom fault?
A. Well, they were aware what the dimensions were in the gateroads, but they had, in my opinion, very little understanding of what it was like in the longwall face.

Q. Is that simply because you can really only measure these things properly in the gateroads, or for some other reason?
A. No, you can get a measurement on what the throw of the fault is in the longwall block through other means. How accurate - I mean, I'm not an exploration geologist, but I do know there are tools out there, be it seismics or underground drilling, which will allow you to determine what the throw of the fault is in an area where you can't get to.

Q. Why would it be useful or important to know that?
A. It minimises the chance that you'll get a surprise, in other words, what you thought is a 2 metre fault becomes

a 4 metre fault.

Q. What problems is that likely to cause?
A. The bigger the fault, the worse it is, as a simple rule of thumb, and that's for various reasons. Bigger faults generally have more destructive influence on the surrounding strata. Bigger faults mean you're cutting - a greater chance that you'll cut outside of the extraction horizon and you'll have to cut stone to mine through it.

Q. Does that raise frictional ignition risks?
A. It will obviously depend on what your material that you're cutting is, but the answer is, yes, it would have to increase it to some degree. Whether it's academic or material, I don't know.

Q. Could we go to slide 9. We're starting to get now to some quite specific mine information; correct?
A. Yes

Q. The title of the slide is "Rock types logged in the lower and upper roof in the inbye end of longwall 104". I just want you to explain firstly what you mean by using the term "logged", logged in what way and by whom?
A. Okay. The mine documents talk about three stratigraphic sandstone units. When I use the term "stratigraphic", I mean that's like a - almost like a proper noun for a rock type, a rock unit, and they are, in ascending order, MR, MP and PP sandstone units.

These are located at between certain marker horizons at set fixed intervals in the roof. I can only infer from the documents that these three sandstone units are of some lateral significance in this part of the world. In other words, they are reasonably consistent in this part of the coalfield.

I'm also inferring from things that I've read that they are of some geomechanical material significance, in other words, they have had a bearing on the ensuing ground conditions on the longwall face in other mines.

Q. You refer in the title of the slide to the "lower and upper roof", and we see distance depictions in the diagrams from zero up to 70 metres on the left and 80 metres on the right. So does that incorporate your concept of lower and upper roof?

A. It does, yes. These sandstone units, they're not - let me take a step back. The geological information that was used in this assessment was in almost all cases what's called a chip log. A chip log is basically - there's two types of drilling that you can do from the surface into a coal seam. You can either core from the surface where you actually physically recover columns of rock and you have the rock physically in front of you that you can log and characterise and test; or, which is a much cheaper way of doing it and much more common way of doing it, you drill with a blind hole and the geologist - you get to your horizon that you're interested in, then you start doing the coring.

Now, when you're drilling down in this blind hole, which is just something like how you would drill a hole in your house, so to speak, the geologist on the surface would be looking at the returns that are coming out of the drilling fluids, and as you would imagine, they are smashed-up little fragments of rock and they are called chips. The geologist would get those chips, look through them and determine whether it is mudstone, siltstone or sandstone.

Q. So the chip log derives from a visual inspection of cored material?
A. Yes, of cored, smashed-up, ground-up material. It's a crude way of logging what rock types there are. You can't see the big picture at all. You just get a vague idea of what the rock type is.

Those logs that were coming back from this exploration program, they did not have - they did not call "This is the MP sandstone"; "This is the MR sandstone". All you knew was that between - in the stratigraphic section, there are marker horizons. You may well see some in other diagrams called like the P tuff, the P seam, they are marker horizons, and you know that these three sandstone channels are generally - not generally - they are always located between certain horizons.

So when I come along, I'm looking at this now and I'm looking for these sandstones between these marker horizons. Chip logs on their own are, from the perspective of what I'm looking at here, close to useless.

Q. Just perhaps to try to encapsulate that, the process

of preparing a chip log is information derived from inspection of the chips from drilling boreholes?
A. Correct.

Q. At a particular distance?
A. Yes.

Q. So the geologist would know from what depth a particular sample had been taken?
A. Correct, yes.

Q. And record his or her assessment of the rock type?
A. Correct. Yes.

Q. That goes into some form of log called the chip log; is that the idea?
A. Correct. That's right.

Q. That's what you've had regard to?
A. Yes, and it's a pretty crude assessment, albeit necessary, but you can't use it - in my opinion, you can't use it in its entirety. You have to use it with some other tool to work out the true nature of that unit where those chips came from.

Q. Is that the nature of the exercise that's represented in these two examples?
A. Yes. What you have there is, on the right-hand column, the black-and-white one, that is an illustration of the chip logs.

Q. Is it your illustration?
A. It is, yes.

Q. So you've created this from access to the chip logs?
A. From raw data.

Q. In this case, from boreholes 208 and 139A?
A. Correct, yes. On the left is a geophysical sonic trace. Now, this trace - after they've drilled the hole, they send some geophysical tool down the hole, and I don't pretend to understand the details, and that does various tests. It looks for a multitude of things.

One data set that it provides is called a sonic velocity trace, and what that's looking for is looking for, in effect, the strength of the rock mass. Stronger rock types, generally denser, will have higher sonic velocities. Through testing, you can correlate, as what's shown here, a given sonic velocity to an unconfined compressive strength.

Q. Tell me, let's take the one on the left, under the heading of RDG208, is that a single or multiple sonic velocity trace?
A. That's a single one.

Q. Taken by the mine?
A. Taken by the geophysical provider, yes, and it's been calibrated to a value called "unconfined compressive strength", which is effectively the strength of the rock mass.

Q. In your report - we probably don't need to go to it - you give a listing of the various numerical values attached to the strength - uncompressed strength of the rock type?
A. Compressive strength, yes. Yes, so what I'm looking for here is - on the one hand, I've got these chip logs, and the key thing I'm looking for with the chip logs is consistent reference to sandstone and not any other rock type, like mudstone or siltstone. So the geo's collecting the chips, and metre after metre run, he or she is seeing sandstone, sandstone, sandstone, sandstone. We don't know whether that sandstone is bedded or massive. The geophysical sonic trace allows us to get an appreciation of how massive that unit is, potentially.

Q. So you've referred to the limitations of the chip logs viewed in isolation, but do the chip logs assist you with an assessment in conjunction with the sonic velocity trace?
A. Correct.

Q. That's what's illustrated here?
A. You need the two in this situation. In an ideal world, you would have core, physical core, and core that you could then cross-correlate with geophysics and you would go, "I know this is what I'm looking for." We didn't have that luxury, so what I was looking for was basically two things - consistent sandstone chips in the geological logs and near vertical sonic traces which indicated that from, in the case of the left-hand plot, that between 30 and 42, 43 metres above the seam, we have a nigh on vertical sonic trace, which is indicative of, or potentially indicative of, a near massive unit.

Q. That's what you've drawn as the MP sandstone?
A. That's the MP sandstone, yes.

Q. So looking at the chip log in conjunction with the data within the sonic velocity trace, are you able then to identify that rock structure between, say, 30 and 42 metres as being MP sandstone?
A. Yes. So we know that the MP sandstone is between the P tuff and the P seam in its geological history or stratigraphy. Now, what a geologist would call the MP sandstone I am assuming could be all the rock types - I don't know this for sure, but it could be all the rock types between the P tuff and the P seam. Okay?

So in this situation here, the MP sandstone in a geological sense could be from 28 metres to 50 metres. I'm not interested in all of it, though. I'm only interested in the geomechanical massive units.

Q. You're looking for whether there's a thick and competent rock type, are you?
A. Yes, yes. I'm not saying that the MP sandstone here is from 30 to 42 metres up. I'm saying it's potentially from 30 or 28 to 50 metres, but the near massive section of it that I'm interested in is what's highlighted in that red box.

Q. What is it about the sonic trace log that enables you to assess its thickness and competence for the purpose of consideration of the phenomenon of airblast?
A. Well, like I said, the sonic trace is a measure of strength, and by extrapolation it's a measure of grain size, mudstone, siltstone and sandstone, and it's also a measure of the bedding. What you're looking for is near vertical traces, consistent traces, where there is no to very little change in the sonic velocity.

Q. Is that what you see, using your skills and experience, adjacent to the area marked "MP sandstone"?
A. Yes.

Q. The relative strength is ascertainable from, in effect, the X axis, UCS?
A. Yes.

Q. And a similar exercise, I take it, was performed with

respect to data relating to borehole RDG139R - same process?
A. Correct, yes.

Q. So far as the area marked with respect to that borehole is noted as MP sandstone, would you tell us whether that, in your interpretation, fitted the description of a massive rock type? Is that why it's drawn there?
A. Where it's highlighted is where I've interpreted it to be thickly bedded to massive. In the report, I use the term "massive", and that's just a grammatical simplification, just to make the words flow better. Basically, when I say "massive", I'm talking about thickly bedded to massive units of anywhere between sort of 0.6 up to 2 metres in thickness.

Q. I'd like to get an orientation to those particular boreholes, Mr Thomas, and to do that I think it may be best to go to a diagram that forms part of your report itself, because the resolution is rather better. Mr Operator, could we go to the report document that we had before, which is TRO.001.001.0001, and I want to go then to page .0030. Can we enlarge the bottom right-hand?

We'll come back to this contour for a different purpose, but for the moment I just wanted to note the location of the boreholes. For the purpose of slide 9, you have depicted RDG208 and RDG139R. Are they the boreholes that are depicted just outbye of the mined section of longwall 104?
A. It was 208, and what was the other one?

Q. Firstly, RDG208.
A. Yes.

Q. And the second one that's shown on your slide 9 is RDG139R.
A. Yes, yes.

Q. I note the correlation in the numbering.
A. Yes.

Q. Are they then the boreholes to which slide 9 relates?
A. Correct, yes.

Q. Later in the piece, we'll come to two other boreholes,

being RDG206 and RDG209. I think some later slides include reference to those and data from them. Are they the boreholes depicted in the mined area of longwall 104?
A. Yes, yes.

Q. Okay, thank you. That's all I wanted to show from that report, just to get a visualisation of where these boreholes are. Do we take it, then, that at least one, if not the main purpose of the assessment for the purpose of slide 9 was to try to identify whether there was thick and competent rock mass within a distance from the mined seam as to be relevant for the purpose of a potential airblast scenario?
A. Yes, it was no more than saying this is the method which I adopted to characterise the overburden.

Q. Let's go to the next slide, then, number 10. On the left-hand side, do we see a section view of the stratigraphy above the seam?
A. Yes, that's a schematic taken from one of the mine site documents just showing the three sandstones, which are in bold, and the marker units which allow you to identify them, and on the right-hand side is another example of where I'm determining to be potentially massive units.

Q. On the right-hand side, we see a similar format to the previous slide, that is to say, chip log data in conjunction with sonic log data?
A. Yes.

Q. There's no location indicated by way of a borehole for that depiction, but you have marked two sections as being massive. Was this just for the purpose of illustrating?
A. It was, and what I'd like the reader to - what I'd like people to see is the sandstone that's been highlighted there, you can see the vertical trace. Now, if you look at the sonic trace from zero metres, you can see that it's more irregular. You can see that it starts to increase in strength, X axis at the top, left is weak, right is strong - it starts to get stronger, and then it progressively gets weaker, then it gets stronger again and then weaker again.

That is a bedded sequence of strata. Bedded strata has lots of inherent weakness planes in it, and, as a result, you wouldn't expect it to form cantilevers and hang up in the goaf. What you're looking for are potentially massive units that will behave in a massive - in a spanning manner inbye the face.

Q. By the way, so far as the diagram on the left is concerned, it's an illustration, amongst other things, of the three sandstone channels that you spoke of. That might give the impression that these channels are sort of uniform in their location and depth everywhere. Is that correct or not correct?
A. I wouldn't pretend to understand the geological distribution of these units. I have inferred that if you see some of the subsequent contours, the MR sandstone is there all the time. Just in areas where I'm depicting it to be not there, I'm saying the massive unit - there's no significant massive units of the MR sandstone, but the MR sandstone is there. It's just in some examples it's not massive, so I'm not giving it any credibility there.

MR RICE: We might come to those contours in a moment. Would that be a convenient time?

THE CHAIRPERSON: Yes, we will adjourn for 15 minutes.

SHORT ADJOURNMENT

THE CHAIRPERSON: Thank you, Mr Rice.

MR RICE: Q. Now, we'll move to slide 11, Mr Thomas. This is the first of a number that contain information via contour maps. This and some subsequent contour maps, are they of your creation?
A. They are, yes.

Q. From information sourced from Grosvenor mine?
A. Correct.

Q. Could you explain what your method was?
A. As we discussed previously, to get the raw data that I was after, and I'll discuss what that was later, the first thing was I looked at the chip logs in conjunction with the sonic velocity logs. That information was then used to generate four contour charts.

The first one and the most important one is the inferred thickness of the massive unit, what you see on the left there. The second one is the interburden to the seam, or the GMS as it's been labelled there, which is the distance between the top of the extraction horizon and the base of the inferred channel. The other two charts are of lesser importance, and one was plotting up the UCS, the strength of the inferred unit. The fourth one was looking at the rock type that was reported in the chip logs.

Now, in terms of, once you've got the raw data - now, the data we're using is of reasonably poor quality. It's not unacceptably poor. In an ideal world, you'd want, as I said before, cored information. You're not going to get that.

So to basically fault check what you've got, the other process that I went through once I had this raw data was to plot that data up on to the mine plan and to, in effect, look for bullseyes.

Q. You have referred a couple of times to the raw data. What kinds of raw data are you speaking of?
A. The raw data would be the thickness of inferred unit, interburden, UCS of unit, dominant rock type in inferred unit.

Q. Was all that information available from the mine records?
A. That was all taken from the geological information provided by the mine.

Q. With the use of that raw data, you've looked to effect a visual representation of certain features; is that correct?
A. Yes, and then I went through that fault-checking process. I wanted to look at bullseyes, are there anomalous data points that don't fit the trend? I also then looked at things like geological information, where logic would say that where the inferred channel is at its thickest, you would expect it to be dominated by coarser and ever stronger rock types. So I then sort of did a very - cross-check in there with all those other parameters to make sure that the contours that were coming up - remember the main contours that I'm interested in are these two what you see here, the thickness and the interburden. The others are really secondary, just a back-up.

Q. For the purpose of the preparation of the contour map, is there an application that enables you to, in effect,

convert raw data to a pictorial representation like this?
A. Yes, we use an off-the-shelf computer program called Surfer, which I don't pretend to understand the statistics, but it basically takes raw data and applies contour curves to the data.

Q. You've used, in the case of slide 11, data to make an assessment of the presence of MR sandstone in thickly bedded massive unit; is that correct?
A. Yes. What we've done since - and it's not covered in this report, so we obviously can't talk about it - is we have looked at much more information in characterising these sandstone units. Now, that further assessment only has a material impact on the chart that you see in front of you. If you look at these charts that we're going to go through now, they deliberately focused on the inbye end of the longwall panels. You can see that there are very few boreholes, for example, in the outbye end of longwalls 101, 102 and 103 in the case of this unit. We're really only focused on the inbye end.

Q. In particular, I suppose the area of main interest is in the inbye end of 104, where I'm hovering the cursor.
A. Correct.

Q. What do we take away from this depiction so far as that area is concerned?
A. What that says to me, the MR sandstone, which again is the lower sandstone, all things being equal, this is the sandstone unit that you will be most concerned about.

Q. Why is that?
A. Because it's the closest to the seam, it can have a more direct impact in terms of weighting potential, and as I described earlier, windblast potential, because the closer the unit is to the seam, you've got less bulking material below you.

Now, in and around the incident scene, you can see the massive section of the MR sandstone - and again the MR sandstone here could well be much more thicker than what I'm representing here stratigraphically, but the massive component of it is less than 5 metres thick. I can't see the data points in there, but effectively from our perspective it's not there.

Q. When you say "not there", by "not there", do you mean

to say not there in a relevant sense?
A. In a relevant sense, yes.

Q. For the purpose of assessment of windblast?
A. Correct. Correct.

Q. The key, by the way, the coloured key, is metres of thickness as a massive unit?
A. Yes.

Q. Moving to the depiction on the right-hand side, so far as the area of interest is concerned, there's no colour contour at all. What do we take from that?
A. There is no massive section there. There's no massive unit there of any note.

Q. When you say "no massive unit of any note", are we speaking there about MR sandstone?
A. The MR sandstone, yes.

Q. So this depiction, in fact the whole slide, is concerned with the presence of the MR sandstone channel?
A. Correct.

Q. As a thick or massive unit?
A. Yes.

Q. If we go, then, to slide 12, this is the same method and procedure, is it, so far as the MP sandstone channel is concerned?
A. That's correct, this being the second sandstone.

Q. If you wouldn't mind just focusing on longwall 104, perhaps you would just explain the pertinent features of that depiction so far as the mined area is concerned?
A. The word "channel" is being used I think in the mine's text and I think in my text as well. Now, I think we all know what a channel is, but for the point of clarification, a channel is a confined fluvial deposit, river-borne deposit. So you would expect some form of lateral boundary to this unit.

What you can see here is - and also, as you can imagine, if you see - you imagine a channel would tend to be thicker generally in the middle and it generally reduces in thickness as it gets towards the edges. What you see here is immediately above the incident site, that channel is at its thickest, and it progressively thins towards the margins.

So again, when I said earlier when all these data points were just put into the Surfer and out came the plots, what I'm looking for then is trends that I can geologically explain and understand, and I'm also looking for bullseyes. So what I'm looking at there is - I can see some form of channel deposit that's going roughly about nigh on 45 degrees across the page and that its epicentre, for want of a better term, is right above where the incident site occurred. From memory, at the tailgate end of where the incident occurred, it was between 15 and 22 metres thick.

Q. You're not talking, are you, about its presence but, rather, about its thickness as a thick and competent rock type?
A. Yes, 15 to 22 metres thick I think is about the number, yes. Interestingly, as well, at the start of certainly longwalls 101 and 102, materially it's not there from the perspective of competency. We start to come into the margins of it at longwall 103, and then at longwall 104 we're into the hub of the channel, so to speak.

Q. From the looks of it, it's significantly thicker, is it not, at inbye end of longwall 104?
A. Correct, yes.

Q. Really not present on 1 or 2, and present to a lesser extent on 103; is that what we take away from it?
A. Correct, correct.

Q. It would also be present, by the looks, on longwall 105, if the mine ever got that far?
A. Yes, yes.

Q. The depiction on the right-hand side - again, if you would just for the moment look at the hatched area of longwall 104, what do you glean from that contour?
A. In the area where the channel is at its thickest, it's at its closest to the seam, which geologically makes sense, and from a geomechanical sense is not a good scenario.

Q. I'm sorry, would you mind repeating that?
A. The fact that where the channel is at its thickest is also the closest to the coal seam makes geological sense.

Basically, this is in the centre of the channel where the river has been at its most powerful and has probably eroded into the rock below it and deposited the greatest amount of material. In a mining sense, we've got, for the want of a better term, a double-whammy here. We've got an increase in thickness and the unit is getting closer to the seam at the same time, albeit marginally, it is getting closer.

Q. We'll come to it in a moment when we get to your conclusions, but you have later said that the thickness of the sandstone of between 15 and 22 metres and its location is 32 to 35 above the mined seam?
A. Correct.

Q. That's the essence of what we conclude from that depiction?
A. Yes.

Q. If we go to slide 13, we've turned, have we, to the subject of rock type?
A. Yes.

Q. With emphasis on the MP sandstone?
A. Correct.

Q. What's the purpose of that kind of assessment?
A. This was just, as I described earlier, me just doing a bit of a sanity check. You would expect that where the channel is at its thickest, you would see coarser rock types, in other words, more yellow and green colours.

Q. Why would you expect that?
A. That's where the channel would be at the highest energy in terms of its flowing properties and along with higher-energy flows, you would get coarser deposits. Along with higher-energy flows, you would get thicker deposits. Along with higher-energy flows, you would get potentially more erosive contacts with the underlying strata, so it's starting to add up as being, yes, these contours are making some sense.

Q. Is this assessment of the existence of fine- to medium-grained sandstone and some coarse-grained sandstone supportive of the proposition that it existed as a thick and competent unit?
A. Yes, it supports it, yes.

Q. Is that the point?
A. Yes, that's the point. If that came back with siltstone or sandstone dominated by interbedded siltstone and sandstone, the red and orange, I'd be going, there's something not right here.

Q. That would be a bullseye to the developing theory?
A. It would be a contradiction. It would be saying this isn't necessarily a high-energy channel deposit.

Q. Understood. In terms of relative strength of MP sandstone rock type, again looking at the mined area of longwall 104, what do you conclude?
A. There's not much to conclude from that, really, other than it's a 40 to 50 MPa rock type, which --

Q. But you need a thick and competent unit, do you not?
A. Yes.

Q. If it's relevant to that criterion?
A. It's a lot more competent than the rock types that we touched on earlier, the ROF2 and 3, which are anywhere between 5 and 20 to 30 MPa, so this is getting up there. It's certainly a more competent rock type. In an industry sense or Australian sense, I'd be saying this is a moderately competent rock. We tend to look for - this is probably more New South Wales biased, but really we start getting interested in rock types of 60 MPa or more. So this is just slightly below that criteria, but in the context of where we'd be lower down immediately above the seam, it's definitely a more competent rock type.

Q. With spanning potential that you spoke about early in the piece?
A. Yes, yes.

Q. The next slide, number 14, speaks about the PP sandstone.
A. Yes.

Q. At the end of the day, is the PP sandstone relevant to the potential existence of a windblast scenario at Grosvenor?
A. No, it's located a long way outbye. You're looking at 60, 70 metres. It's also generally a more bedded unit, but in terms of its massive section that I portrayed here, you can see it's really not of any relevance to the inbye end

of longwall 104. It's no more than 10, 20 metres thick, and it's located 60, 70 metres up into the roof.

Q. Then you come to your conclusions, but perhaps we've discussed them already. Is there anything you want to add to what we see there?
A. No, the stand-out stat is bullet point 3. It sticks out as being so different to the rest of the mine.

Q. We can carry on with your conclusions on slide 16. You've noted an extract from the windblast guideline, at the first dot point, and then at the second and third dot points, you speak about high-level periodic weighting and you refer to it as a means of comparison. What's the point of making that comparison?
A. I'm trying to put the - ignoring what - before I got to the conclusion of what I think happened, I tried to take these parameters, the thickness and the strength, and I tried to look at - I tried to see where they sat in regard to accepted rules of thumb.

The first one is the New South Wales guideline of competent units of 10 metres or more of thickness - tick, we've got that. We have a unit that's greater than 10 metres in thickness.

Now, from our and other companies' perspective, we look at high-level periodic weighting in terms of size of sandstone units of 20 metres or greater thickness with a nominal UCS of 60 MPa located within 60 metres of the extraction horizon, although as I said earlier, it could be up to 80. We're not there. It doesn't tick the high-level periodic weighting box, and although we haven't got to it yet, the longwall monitoring agrees with that. They did not get high-level periodic weighting on this longwall. So it's agreeing with that conclusion, effectively, that it is a competent unit, but it's not such a competent unit that you would expect high-level periodic weighting.

Q. It doesn't meet those criteria, but does it then meet the criteria, for example, specified in the New South Wales guideline of 2007?
A. Yes, yes.

Q. As we move to the next slide, number 17, we begin to deal with the subject of faults. On the left of that slide is just a reproduction of the map that we saw earlier; is

that correct?
A. Correct.

Q. On the right-hand side, there's a lot of detail in that map and there are diagrams with better resolution than that, which we'll go to if need be, but what is the diagram on the right-hand side?
A. That's taking the geological mapping reports, and it's taking that information and transcending it on to a mine plan, and the key takeaway points from that are, although you can't see it, the throw of the fault increased in one area up to about 4 metres and, also, that it wasn't a neat, clean fault. It would probably be better characterised as a fault zone with lots of smaller faults and shears in that zone.

Q. Perhaps we might go to a better depiction of that, and you might be able to illustrate it. Mr Operator, could we go to a different document. It's RSH.022.004.0001. It's at page .0008. Is that a larger depiction of the smaller version of that?
A. Yes, it is. Correct, yes.

Q. You've taken the geologist's face profile maps prepared from time to time and put it into a form of a plan; is that the idea?
A. Correct, yes.

Q. Are there particular features of that that are worth noting?
A. You'd have to blow it up a bit more, but you can see in the middle somewhere it gets up to 4 metres in throw, but you can also see where the cursor is now how much more - it is not one clean fault. It is a zone that is nominally, I'm guessing, 40, 50 metres wide of effectively smashed-up strata. It's not always that --

Q. Could we blow up the middle of the page, please.
A. Just at the bottom there, you can see where it gets to 4 metres, just right at the bottom.

Q. You see the depiction of 4 metres there.
A. Right to the bottom, you can see 3.7, 4. But you can see how much it changes just over that - what is that - 50, 60 metres of retreat. I mean, you've gone from half a dozen or more faults of various throws to where the cursor is now at two faults. It's a pretty complex

structure.

Q. If we just go above that to tailgate chainage 4147 and go across, we see that it appears to span a reasonable width. If the longwall is 300 metres wide --
A. I'd be guessing 40 to 50 metres in places, maybe more in some areas, yes.

Q. Mr Operator, could we enlarge the bottom half of that page or even the bottom of the diagram. You see a representation on that of, towards the end of 104, tailgate chainage, for example, 3998 and 4005, mapped on 4 and 2 May respectively, and you've drawn a number of cavities there as well as depictions of the fault; am I right? Are there cavities depicted there, for example, at 4005, Mr Thomas?
A. Correct.

Q. Being the 2.5 metre cavity right at the end of the tailgate, a 3 metre one at about shield 130, and a 2 metre one then extending back to shield 110?
A. Correct.

Q. In terms of fault at that point we see 3.2 metres; am I right?
A. Yes.

Q. Is that the throw of the Fooey fault at 3998?
A. Yes, I think so, yes.

Q. And about the same or 3.2 perhaps also at 4005?
A. Yes.

Q. Present as a single fault or as, I think you used the term, mishmash earlier?
A. Well --

Q. Is it possible to make a characterisation at that point?
A. I would describe this as a fault zone more than anything. There isn't invariably one structure. There's several faults in this zone, and in some cases, as you see in the blue line, not all the faults are in the same direction.

Q. You've also drawn a depiction of the reverse fault, which we're about to come to.

A. Yes.

Q. I'll just draw attention to its location on the plan that you've drawn.
A. Correct, yes.

Q. Let's go back to the PowerPoint, thanks, Mr Operator, slide 18.
A. I guess the other key thing is the fault's angle of intersection with the face. At 45 degrees, that's a reasonably favourable angle of intersection.

Q. We've just got slide 18 up now. You make the first dot point that the roof at the tailgate end is bounded by a number of faults, and the face mapping that's extracted there, is that for the purpose of illustration of that dot point?
A. Correct, yes.

Q. Perhaps we might go to the faults that are depicted there. I have the cursor at towards the left of the picture where it depicts 0.1. Is that a fault?
A. Yes, it would have to be, yes, yes.

Q. The line next to it, about mid-face?
A. I'm not sure what that would be. Whether that would be just a shear, I don't know. I don't know.

Q. If we go perhaps to the busier end of the diagram, at the tailgate, we notice at shield 98 to 101 there's a depiction by the geologist of TTF 2 metres. That's tip to face?
A. Correct.

Q. What does a tip to face 2 metres at that point indicate?
A. I would say that, although we haven't discussed it yet, in the absence of high-level weighting, that's indicative of a structurally disturbed coal seam, albeit not faulted. It may well just have a lot of cleat or joints in it, and that's just breaking up progressively and resulting in that 2 metres tip to face distance.

Q. To its right, we see a notation "normal fault net 3.2 metres". Is that the so-called Fooey fault?
A. I think all of the - my interpretation of this, and I may be wrong here, but my interpretation of this is that

all these faults are part of the Fooey fault zone, but whether that is strictly speaking the Fooey fault, it may well be. I don't know. You'd have to ask the geologist on that one, but it's certainly the main part of the fault.

Q. What does the word "net" mean - N-E-T?
A. That's the cumulative of all those individual fault throws, I think, all added up together.

Q. Further to the right, towards the tailgate, there's the expression used "face lipped up". Does that mean something to you?
A. I don't know what that means, no. I would be guessing.

Q. Adjacent to that, on the right, you've made particular note of the depiction of a reverse fault?
A. Yes.

Q. Noted by the geologist as being 400mm; is that right, 0.4 metres?
A. 0.4 metres, yes, yes.

Q. You've referred to it in your second dot point as being mapped at a shallow and therefore unfavourable angle to the face. Why is it unfavourable?
A. As per one of the schematics we discussed earlier, faults angled at the shallow, certainly less than 20 degree angle to the face - again, they increase the likelihood of block detachment and they affect a greater length of the face, as in number of shields.

Q. This is mapped at tailgate chainage 3998. Now, we know that the incident occurred at or around 3991 or thereabouts. In other words, let's not be too precise about it, but the point is that it was some metres from this mapped point. Does the reverse fault noted at this point continue to be relevant to the ensuing metreage of retreat and to the incident that occurred some days and some metres later?
A. It may, potentially, yes.

Q. Why?
A. Well, the reverse fault moves away from the supporting influence of the longwall shields or the coalface and the longwall shields, and once it moves inbye of that supporting influence, because of its angle in a vertical

sense and alignment to the face, it has a greater potential to fail.

Q. So once the retreat extends a number of metres, it loses, does it, the support of the shields?
A. Correct.

Q. And of the coal seam beneath it?
A. Correct.

Q. You've also made note in the third dot point that there was a low angled shear mapped parallel to the face 11 metres prior to ignition. We can go to it if need be, but are you speaking there about a notation that was made in the strata management review team minutes from the afternoon of 2 May? Do you recall that, or do you want to have a look at it?
A. No. Yes, that's where it comes from.

Q. There was a notation there, I'll just quote from it, if you don't mind, the notation from the minutes in document RSH.024.031.0001:

> *Probable low angle, face parallel shear extending from TG in combination with two faults ...*

Is that what you're referring to at your third dot point?
A. Yes.

Q. What's the significance of that?
A. In view of the failure mechanism we've yet to discuss, it certainly could have been a contributor, but I would say that this fault here, in view of its throw, in view of the fact it is a fault, not a shear, in view of its location where it was at the time of the ignition, is probably much more significant than this low angle shear. Whether the low angle shear had some impact, I don't know. It wouldn't have helped.

Q. All right, we'll go to the next slide, number 19. You've sought to illustrate there, have you, the significance of the reverse fault as mapped by the geologist?
A. Yes, there's a note in the geological report that this is upthrown outbye. To help other people understand that, it means that - outbye is obviously where we're mining to,

but that block of rock has been displaced over the inbye block. Effectively what it means - we don't know what the angle of that fault is, by the way, there's no record of that, but for the purpose of illustration I've just shown it being 45 degrees to the horizontal. Basically that means we have a fault that dips into the face and that further weakens the fault-bounded rock mass and, in doing so, increases the likelihood that it could fail catastrophically.

Q. For the purpose of this illustration, you've drawn the fault at an angle of 45 degrees commencing from the bottom of the seam and extending further upwards through the interburden to the upper unit?
A. Yes.

Q. Is that an assumption on your part?
A. That's an assumption, yes.

Q. What factors would allow you to make that assumption?
A. The main factor that allowed me to make that assumption was the nature of the outcome, to be honest.

Q. When you say "the outcome", as illustrated, for example, by the workers' accounts that you've now read, or other information as well?
A. The inferred sudden failure of the sandstone unit and, yes, the workers' accounts of the absence of any audible signs of failure prior to the blast. In other words, this thing just went, it just slipped and fell. There was no sounds of cracking and groaning in the roof as if the - in one of those schematics that you saw early on where the failure in the cantilever would be trying to propagate itself through an intact rock mass. It doesn't need to do that if it's got this pre-defined plane in it. It just slips on the existing plane.

Q. Let's go to slide number 20 and the illustrations further depict the significance of a reverse fault; is that right?
A. It could be any fault, dipping fault. A reverse fault is a compressive fault, and the normal fault, which is what the Fooey fault zone is primarily, is a tensile fault. But for the point of what I'm trying to show here, I'm really trying to labour on the significance of the angle of the fault, whether it dips into or away from the face. If it dips into the face, as in our case, you can see from that

top schematic that the fault-bounded block can be easily mobilised and detached off the fault plane; whereas in the bottom one, there is much more of a wedging action and it can actually confine itself and not slip so catastrophically.

Q. You've said in the first of the dot points on that slide that all of the faults mapped, which we've looked at, in the tailgate end, would have increased the potential for block detachment. Can I ask you, is that on an individual basis or on a cumulative basis because there are a number of faults?
A. Probably the latter, if I get the meaning of what you're trying to say. There is a mishmash of faults there. There are going to be fault-bounded blocks that are going to be able to readily slip on those weakness planes, and that could occur on faults that are aligned 45 degrees to the face, but what I am saying is any faults aligned subparallel to the face would be more prone to block detachment.

Q. If we go to slide 21, I think the first dot point is the one that you've just made.
A. Yes, immediately prior, seconds prior to the event, a number of shields at the tailgate end of the face measured a nominal increase in leg pressure, and that to me is indicative of some form of change in the goafing behaviour and something has let go and somehow transmitted its load on to the longwall face. Whether that's due to it physically deforming and loading up the face, or whether that's due to some form of shock load - probably the former.

Q. The timing is relevant, is it not?
A. It's literally a second or two, maybe less than, prior to the event.

Q. Is that what would associate this increase in leg pressure with the event itself?
A. Yes. You've got increasing goafing action resulting in a nominal increase in leg pressure, resulting in a - associated with a detachment of a large block of material in the goaf and from that ensued the expulsion of goaf gas on to the longwall face.

Q. It is your hypothesis, then, isn't it, that this event at Grosvenor was the - or at least circumstances existed

which were consistent with this event being a windblast or airblast event?
A. Definitely, yes. Yes.

Q. You say "definitely". Are you expressing confidence in that conclusion?
A. Yes.

Q. Tell me, you did go underground, did you not? I can't remember the date.
A. It was several weeks after the event.

Q. I think Mr Self might have been present on the same day. Do you recall that?
A. Yes.

Q. Did you have the chance to walk the longwall on that day?
A. Yes, yes.

Q. I'm just interested to know whether, having been there with the opportunity to make such observations as you could make, was there anything which supported or detracted from the hypothesis that you have been speaking about, just from your observations?
A. No, no. Clearly from nominally shield 100 to the tailgate, it was a structured block of coal. I didn't think there were signs of high-level weighting. There were definitely signs of spalling cavities on the face, which I think was probably more related to the fact that it was just inherently a very weak piece of rock. And really they were my conclusions. I couldn't see anything other than that.

Q. Slide 22 turns to the subject of bulking ability. You touched on what bulking ability and bulking factors are earlier in the piece. Is this for the purpose of making a comparison of the bulking ability across the four longwalls?
A. Yes, I'm trying to - so obviously to get a windblast, you need two factors. You take one away and you don't get a windblast. As we discussed earlier, I think we've got a unit that's competent.

Q. In the right location?
A. In the right location. It's not "out there" competent; it's not periodic weighting potential, and

that's consistent with the outcome, but it's competent. So the next piece in the puzzle is, well, we must have an air gap. We must have had it. How could we get an air gap? This thing was located 32 metres minimum above the seam. There's various things that can affect the ability of that material that's below the sandstone unit to bulk up, and we don't really know the precise volume of bulked material. We don't really know. It's a goaf. You can't get in there.

What we do know is some very simple, fundamental rules of thumb, and that is weaker rock types - in other words, mudstone, siltstone, dominant rock types - have generally lower bulking factors compared to stronger rock types. There's a few reasons for that. But weaker rock types generally tend to either fall and, when they fall, they break up in nice, uniform pieces and compact neatly together, whereas stronger rock types, you can get all manner of sizes, that size to car-size pieces, and it doesn't really fit well together, so it's a bigger bulking factor.

The other reason is weaker rock types are generally more bedded and they tend to fall down in nice, planar sheets and, again, they pack up neatly and you get low bulking factors.

As a point of context, what you're after, or really what you don't want is a low bulking potential, because you want the thing to bulk up and support or - not support, but, you know, minimise that air gap between the goaf pile and the competent unit that could fall.

In this situation, you're looking at, how can I explain this air gap? So what we do here in this chart is I've looked at the percentage of sandstone units in the lower roof below the MP sandstone and I've just done an apples and apples comparison between longwalls 1, 2, 3 and 4. The blue colours are high percentages of sandy rock types, and the hotter colours are low percentages.

And I wouldn't dare go into the detail here, but you can see that as you go from longwalls 101 to 104, we get proportionally more weaker strata and therefore more strata with a potential low bulking factor.

Q. At slide 23, you've set out some comments there. In

Transcript produced by Epiq

the second dot point, you've referred to a formula of between 1.1 and 1.3 for weak bedded rock types and 1.5 for more competent sandstone rock types, and you've, I think, done a calculation in your report selecting a particular volumetric ratio range for the rock types in existence at the accident point. What was the range that you adopted?
A. I used 1 to 1.15 and that's all I - the point I've tried to illustrate there is that if we had very low bulking factors, you could, without any other assumption, conclude that there was an air gap of, I think, without bringing other variables - and there are other variables to consider, but without bringing other variables that could affect the bulking ability of the goaf, you could calculate with a very low bulking factor I think it was a 1 to 2 metres air gap.

Q. Could we go to your report and if you point out where you've said that and maybe you could speak to it.
Mr Operator, could we go to TRO.001.001.0001, at .0010, and could we highlight the portion of the page about one-third down, in other words, the bottom half of that first dot point. This is where you've done your calculation; am I right?
A. Correct, yes.

Q. As we see there, you've assumed a bulking factor of 1.1 to 1.15 and you refer to "the resulting 24 metre interval". What is that a reference to?
A. That's between the floor and the MR sandstone. Whilst the MR sandstone is not massive, there's a bit of detail you need to understand.

Q. Yes.
A. Based on the information we've got, compared to the square lines, the start-ups of the previous longwalls, as a general rule below the MP sandstone the rock mass got weaker, therefore low bulking factors. But also, in and around the immediate area of the site, the MR sandstone, whilst it's not massive, there is a sizeable bed of MR sandstone there, which conceivably, if that had hung up momentarily - again, not to cause any weighting, but if that had hung up momentarily - we could have calculated, with those low bulking factors, a 1 to 2 metre high void.

Q. Well, does that hypothesis depend on the proposition that the MR sandstone did hang up?
A. In this one scenario, yes. There are other scenarios

that we could go through in that point.

Q. I notice a bit lower down you've referred to the presence of cavities, a number of which we've noted, and you said that:

> *... it is reasonable to assume ... the effective height of extraction would have ranged between 6 and 9 metres ...*

I think we understand that we add the normal horizon to the height of the cavity to get the 6 to 9 metres that you refer to?
A. Correct. So there was a bigger void for the material to fill in. In that scenario, you could calculate that those bulking factors are anywhere between 1 and 6.5 metres of air gap.

Q. I don't know if you need a device of some kind, but, if not, could you tell us how you do arrive at that figure of 1 to 6.5?
A. Well, basically what you've got is you have a true extraction horizon of, let's say, 4 metres and let's say above that you've got 20 metres of rock that falls into the goaf and then bulks up and supports or closes up the air gap. But of that 20 metres, if 4 of it falls out at the face and ends up getting transported out of the mine, your void has gone from 4 to 8 metres, and the amount of material that's available to bulk up has gone from 20 to 16. As a consequence of that, you have a greater likelihood that you could end up with an air gap purely because you've got a bigger void to fill in and you've got less material to fill it up. We don't know what the bulking factor of this material is.

Q. You have to make some assumption --
A. Yes.

Q. -- based on what is available to you; correct?
A. And commonsense from - the literature the world over says that weaker rock types, and we know because we discussed this earlier, that the rock immediately above the coal seam here is very weak, less than 10 to 30 MPa material. It is bedded. It is, as a result, going to have a low bulking factor.

Something that's not mentioned in this report that is also of relevance is that the fact that we've got fault-bounded material that could displace en masse as one big block - that would have a very low bulking factor as well. Let's just think of it again in simplistic terms.

So you've got bulking factors where rock falls into a goaf and, in the process, it breaks up. Okay? And we've already established that weak rocks tend to compact neater and/or they tend to fall and lay on the ground in nice, neat little stacks. Sandstone rocks will all be big, higgledy-piggledy, jumbled-up rocks and with a bigger bulking factor.

There's also a scenario whereby if you've got fault-bounded blocks, let's say a 20 metre interburden between the extraction horizon and the sandstone unit. Let's say that 20 metres is completely surrounded by geological structure. When it gets into the goaf, that 20 metres goes plop on to the floor as one big mass.

Q. No bulking?
A. There's no bulking. It's a bulking factor of 1. What do we know here? We've got structure everywhere. So there is a chance that this material may not have all broken up and resulted in bulking factors of 1.1 to 1.15 or whatever. It didn't have to do that to have a low bulking factor. It could have just all gone plop, plop and ended up with these large blocks of fault-bounded, joint-bounded material.

Q. The exact scenario you would never know, presumably?
A. No, you'll never know, and I don't know - as I say, I don't know what the size of that air gap is or what the bulking factor was. All I'm saying here, and what I've just said about the structure, is that it is not beyond the realms of fancy to calculate it. I mean, the outcome says we must have had an air gap.

Q. While that's on display, would you have a look at note D, commencing with the words:

... accepting that the goaf drainage hole GR04V010 ...

Just take a moment to read that.
A. Yes, what that note is saying is that there was a goaf drainage hole --

Transcript produced by Epiq

Q. Closest to the face?
A. -- closest to the face, and that was reporting high oxygen make, and obviously the oxygen comes from the ventilation stream, which says that certainly up to the base of the MR sandstone, that material had fallen in quite quickly behind the face, because I think those goaf drainage holes are drilled nominally 20 metres above the seam, and the MR sandstone is nominally 20-odd metres - the units that I was looking at were around 20-odd metres above the seam. So what that is saying is that the weaker material below the MR sandstone, that had fallen in quite quickly.

Q. You could tell that because the goaf hole was operational?
A. It was operational and it was reporting high oxygen.

Q. Those two things together?
A. Yes.

Q. Can we go back to the PowerPoint, thanks, Mr Operator. We're on slide 24, and these are the two other boreholes that were shown in the map earlier, being those within the mined area of longwall 104. What point is to be made from what you've depicted there for each of those boreholes?
A. This is the point I touched on earlier whereby if you look at those holes, you can see the MP sandstone is the highlighted box, the lower of the two boxes, and these two holes which are the closest to the incident site, immediately below the MP sandstone, there is some level of sandstone there, which is presumably part of the MR sandstone. What I'm saying is if that hung up momentarily, that could have therefore exacerbated the bulking potential, because again you've got less material falling in to bulk up in the goaf.

If you compare this slide to holes somewhat away from the incident site but still at the inbye end of the longwall, if you go to the next slide, you'll see that those units have gone, and all I can conclude is that the fact that we've got those sandstone beds, which are not that thick --

Q. Just pause a moment whilst we work out how to advance this, Mr Thomas. Okay, we're at slide 25.
A. These are still in and around the area of the incident site, by the way, but they're not the closest holes. If

you look at these holes, below the MP sandstone there is no sandstone really of any note. It's all weak material. You'll never know, but what I'm saying is that you could argue that that 5 to 10 metre thick bed of sandstone located below the MP sandstone, if that had hung up, it could have exacerbated the bulking problem.

Q. You pose that as a possibility. I may have asked you this already, but that possibility of the MR sandstone hanging up to some extent - does your hypothesis depend on that having occurred?
A. No. No, it doesn't, no.

Q. It's a potential additional factor?
A. It's one of, I think, three ways that you could conceivably calculate an air gap. Which one it is I don't know.

Q. All right, I've put up slide 26. I think you've already dealt with the matters there.

The next slide is number 27, also to do with bulking ability, but you factor in here the number of cavities that were evident at the tailgate end of the face?
A. Yes, in particular at the time when the face was injected with PUR. You can see in the bottom window, there's a lot more --

Q. Just try to enlarge that.
A. You can see that that red - around the time when the PUR decision was made, you can see that that face had fallen up to heights of 2 to 3 metres, or whatever the number is, which again would have exacerbated the bulking - the potential for an air gap, I should say.

Q. This one I think is dated, although the resolution is not too good - this is the one that was mapped on the afternoon of 2 May?
A. Yes.

Q. At tailgate chainage, according to the geologist, of 4005?
A. Which then proceeded to move into the goaf as the longwall recommenced production.

Q. Above that, the next map that was done was on the 4th, and it's one that we've already looked at, at tailgate

chainage 3998?
A. Yes.

Q. The PUR injection, by the way, occurred in a sense in response to the geologist's findings on 2 May?
A. That's my understanding, yes.

Q. And in response to the strata management review team meeting and minutes on the afternoon of 2 May?
A. Yes, I understand that, yes.

Q. Going, then, to slide 28, I think we've probably discussed all of those points.

At slide 29, this is your conclusion, is it not, that there was in existence a thick spanning sandstone unit in the near-seam overburden, being the MP sandstone unit; correct?
A. Correct.

Q. At point (ii) you note the presence of one or more faults?
A. Correct.

Q. The third point relates to the issue of bulking factors that you've discussed now at some length; correct?
A. Correct.

Q. The depiction there, is that intended as an illustration of a section view from tailgate to maingate at the point of the incident?
A. It is, yes.

Q. You've drawn some coloured markings there behind the shield, and I think as we'll turn to some other of your illustrations, the yellow was intended to depict PUR-injected coal?
A. Correct.

Q. The blue markings were intended to depict void fill?
A. Correct.

Q. If we go to slide 30, you've spoken there about the proximity to the protected end of the tailgate. Can you explain what the concept of a protected end is, Mr Thomas?
A. Yes. In the top schematic there, the black is obviously coal yet to be mined. That longwall is mining up

the page. The overburden, as we've discussed, caves in various ways behind us.

Now, it's not the same geometry across the whole length of the face. You can appreciate that in the corners, you've got pillars of coal that have been left behind. They will restrict the caving process in that overburden, and, in effect, the overburden at the corner of the face can bridge from the yet-to-be-mined coal to the chain pillar. The longwall fracturing is assumed to take this fracturing arc-type profile, and you can see these arc-type fractures on the surface when you get substance fractures reaching the surface, so it is a real thing.

What is also a real thing is that underground in this - we call it the protected end, because at either ends of the longwall, the face does not see full loading because the load is, in effect, being shared between the coalface and the pillars. It's protected from full overburden loading, and that rock mass hangs up more and protects the face.

Now, in the context of most mining scenarios, that's good because the face is not getting a full thump, so to speak, from the overburden. But in the context of where you want rock to fall in behind you regularly, arguably it's not good, because the protected end will allow this thing to span more.

Now, in the context of the windblast mechanism we're talking about, we don't want it to span. We don't want it to span. We want it to cave as soon as we move the shield, "it" being the MP sandstone.

So the possible conclusion I'm drawing here is the fact that these faults moved into the tailgate end of the face, the protected end of the face, meant that the overburden was more likely to hang up longer than normal and that when it did come in, a bigger than normal lump came in, which is why I think we didn't get a similar-type event when the fault was in the middle of the face, because in that part of the face it was all readily failing. It didn't have any ability to stand up. It was coming in straightaway, whereas at the tailgate end of the face, it almost, like, teased us.

Q. Do I take it also that this is a proposition that

you've advanced which is difficult to prove one way or another --
A. Correct, yes.

Q. -- but is one that - do you see it as making additional sense of the scenario?
A. Yes, yes.

Q. The second schematic is a type of mining that was certainly not used at Grosvenor and I don't think is used in Queensland; am I right?
A. No, it's not, no. That's where everything occurs way, way behind you, because you've got a narrow panel. Call it shortwall or mini-wall. It's done for comparison purposes, that's all.

Q. At slide 31, you've expressed some conclusions, which I think we've discussed.

At slide 32, you commence by referring to the content of some mine site documents, referring perhaps to the secondary extraction risk assessment, and I think there's a first goafing risk assessment as well?
A. Yes.

Q. Both of those acknowledge the possibility of windblast?
A. Yes.

Q. In the case of the first goafing risk assessment, that's, as the name would suggest, in the context of first goafing?
A. Yes.

Q. You've said that those documents are not substantiated by any rigorous geotechnical studies. Is that a conclusion you reached based on your review of the information you were provided with?
A. Yes, I didn't see much in the way of any evidence for rigorous longwall geotechnical studies of this longwall.

Q. What would such a study involve - the kind of exercise that you've been through?
A. Similar, yes.

Q. To look, for example, for the possible presence of a thick and competent spanning unit?

A. Correct, yes.

Q. Is that the kind of thing that you're talking about?
A. Yes, yes.

Q. Incorporating the concept of bulking factors, as you've discussed?
A. Yes, yes.

Q. Is that the kind of content that you're referring to?
A. Definitely, yes.

THE CHAIRPERSON: I see it's just about 1 o'clock, Mr Rice.

MR RICE: That would be a convenient time.

THE CHAIRPERSON: All right, 2.15. Thank you.

LUNCHEON ADJOURNMENT

MR RICE: Q. Mr Thomas, we were looking at slide number 32. We had dealt with the first dot point. There are some notes under that, the first of which refers to longwall 104's hazard plan. I'd just like to put that up on the screen so we can see the whole thing, and then we'll turn to the part that you make comment about. Okay?

Mr Operator, could we put up, please, AGM.003.001.0607. That's the whole of the document that you are referring to at that point of your presentation?
A. Yes.

Q. Do you know what the purpose of that kind of document is?
A. It's to convey to the operators the geotechnical and geological risks that relate to the extraction of this longwall panel.

Q. By "operators", you mean the longwall operators?
A. Yes.

Q. So, as far as you understand, it's for their consumption and their assistance?
A. Correct.

Q. It contains a lot of information, and I don't want to

go through it all, but you have an observation to make about what you call the GSR section. Thanks, Mr Operator, if we can go back to the slide show, and we actually see enlarged on your slide 33 the section of interest; correct?
A. Correct, yes.

Q. What limitations does that convey to you?
A. The circumstance on the MP sandstone has - well, it has effectively been truncated and is not included in the hazard plan, and from that you can determine it hasn't been determined to be of any relevance to the geotechnical hazards facing this longwall.

Q. Whereas for the reasons you've identified you did see a relevance to its presence and features at the point at least of the accident?
A. Correct, yes.

Q. What do you mean by - you say "the mine site's reliance on GSR"? Can you explain that?
A. I think GSR provides a very user-friendly picture of the roof geology, and I would say that it certainly allows the engineer to get their head into the space of what geology is relevant or not relevant. Whether it allows the engineer to actually work out the detail, I am suspect on that. I am not clear whether that is the case. In other words, it can tell you where there's sandy rocks and where there's non-sandy rocks. But does it allow you to work out whether there are massive units in those sandy rocks?

Q. Well, at any rate, this depiction doesn't extend beyond 40 metres above the seam?
A. No, no.

Q. Is that correct? Whereas you've pointed to features at that point which you say are relevant to the hazard?
A. Correct, yes.

Q. There's just a couple of other points you make on slide 32. You mention at point (b) some studies conducted by the mine site, and at point (c) some Geotechnical Advisory Board meetings, minutes of which I think you've seen; correct?
A. Correct, yes.

Q. You make the point that in both those sources, there didn't seem to be any focus on other than the immediate

roof control and near seam and competency of the overlying strata?
A. I would say two things are definitely correct. Where they have done geomechanical studies it's focused on immediate roof control or recovering longwalls from - longwall equipment from panels, and I would say almost all geotechnical documents at the mine focus on other issues other than longwall geomechanics. It's not the focal point of the geotechnical documents.

Q. You make a fourth point about the first goaf risk assessment. What point are you making about that?
A. There's actually an error there, which has been corrected in my draft report that you haven't seen, but the intent is the same, that it was - from a first goaf risk assessment perspective, it was ranked as moderate.

What the error relates to is not the probability level, which is a level 3, which means something occurs every 5 to 10 years in the risk rating system. Where the error is is in the consequence level and the error is actually a bit more damning than here. The reality is the first goaf risk assessment in terms of consequence rated the consequence as a regulatory consequence, not a safety consequence. They did not risk assess a goaf fall related expulsion of methane on to a longwall face in terms of its potential impact on operator safety.

Q. In any event, as the name suggests, the risk assessment was connected with first goaf only?
A. Correct, yes.

Q. At slide 34, we see again that map or the plan that's been plotted. You make a similar comment, do you not, about the decision to mine through the Fooey fault, that the significance of block detachment didn't seem to have been analysed?
A. No, no.

Q. There are just a couple of other slides if we go forward a bit to number 38. You've attempted to encapsulate there, have you, the features derived from a number of the face profile maps?
A. Yes.

Q. Being those conducted at 4005, 3998 and 3990 metres?
A. Yes.

Q. You've noted so far as the PUR is concerned, the May program consisted of injection between shields 97 and I think about 132?
A. Correct, yes.

Q. And the portion of that is taken up also with void fill?
A. Yes.

Q. Going to slide 39, you've noted there approximate finish position of all run of face shields. Can you tell me what you mean by that?
A. The difference between this slide and the previous one is this is showing where the PUR - bear in mind the PUR was injected primarily into the roof of the face, which is what they call C holes. Where that PUR would have ended up, had it fallen almost certainly into the goaf, where it would have ended up when the shields got to their approximate finished position.

Q. In other words, if mining is continuing to the top of the screen, the PUR is behind the shields?
A. Correct, yes, and not too far behind.

Q. I think that's all for that document. By the way, you've given us the benefit of your interpretation and experience within your field of skill and expertise. You are not, are you, an expert on the physics or dynamics of methane explosion?
A. No.

Q. Or its capacity to cause a wind gust?
A. No.

Q. Thank you. Now, you did a second short report dated 10 February 2021. I'd just like to bring that up, Mr Operator. It's RSH.022.002.0001. There are eight numbered paragraphs. Do we take it from the content that you were asked to comment on features of the strata in existence at the face and roof vicinity of the longwall at the time of the PUR injection?
A. Yes, and what sort of potential impact that could have had on the quantity of the PUR that was injected.

Q. Some of these comments are fairly self-explanatory, so I won't ask you to enlarge on them, but could you go to the

next page, Mr Operator, perhaps to paragraph 6. You refer to the angle of the holes and the location of the packers, and I think one of your schematics later in the piece is the face consolidation plan. Perhaps we might go to that. That's page .0005, Mr Operator. That's the document, is it not, that tells you where the holes are to be drilled and what kinds of holes they are?
A. Correct, it's the green holes, I think. Yes.

Q. If we go back to page .0002, at paragraph 6 you're making the point that having regard to the angle of drilling of the holes and the insertion of the material into those holes, given that it's on an angle, it penetrates horizontally between 1 and 4 metres into the face; is that the idea?
A. Yes, that's an educated guess, but you don't really know how far it goes, but the majority of the material would have been 1 to 4 metres into the face, yes, you'd think so.

Q. At paragraph 8, you talk again about the injection of resin and say that:

> *... a significant amount of the product would have concentrated in a reasonably small area of the coalface ...*

We've already noted from paragraph 6 that the horizontal distance of insertion was perhaps 1 to 4 metres. Is that the reasonably small area that you're speaking of?
A. Well, yes, 4.5 metres, which is the length of the hole, is not a long PUR hole. I mean, it's not a short hole, either. But considering in conjunction that nearly every hole took the full allowable limit of product, by default you are concentrating a lot of product in a reasonably short distance.

Q. And yet the product was applied across the width of shields 97 to 132?
A. Yes.

Q. Probably, what's that, 70 metres? It's not a small area in that sense, is it - or is it?
A. In terms of depth into the face. The length is - I wouldn't say it's immaterial, but the point I'm trying to make is the distance into the face, not along the face.

Q. And you draw attention to the quantity of product applied per hole?
A. Correct, yes.

Q. To support your assessment that there was a significant quantity concentrated within that 1 to 4 metre distance; is that the idea?
A. Yes. Almost certainly, yes.

THE CHAIRPERSON: Q. Sorry, that's 1 to 4 metres in breadth; is that right?
A. Yes.

Q. Width?
A. Yes.

Q. Behind the shields?
A. Ultimately it would have been behind, yes.

MR RICE: Q. It's applied, is it not, ahead of where the shields are presently located --
A. Yes.

Q. -- or as they were at the time of injection, being on 3 May?
A. And the key thing is most of it, or a significant percentage of it, was aimed at the roof, not the actual coalface. And by going into the roof, it meant that a significant percentage of that would have then ended up going into the goaf. Obviously if it went into the coalface, it would have been cut and loaded out of the mine. That wasn't the case.

Q. Okay, thank you. There's just one more schematic that I'll ask you about. It's at page .0006. We can go to it if we need to, but perhaps you can tell us, for the purpose of preparation of that, have you had regard to the PUR injection report for the May program of application of PUR? Do you want to see it to make sure --
A. I know what you're talking about.

Q. I'll just give a reference to the report, although I won't ask for it to be brought up. It's AGM.003.003.0129. Having regard to the listing in that report of the volume of material applied to each hole, have you prepared this diagram?
A. Correct, yes.

Q. To take the May program, being the one depicted in red - am I right?
A. Yes.

Q. All the dots along the top row against the figure on the Y axis of 180 are the holes to which a full complement of PUR was applied?
A. Correct.

Q. Whereas those in squares below that indicate the shields - or, rather, the holes which were filled to a lesser degree?
A. A lesser degree because the rock mass was in a highly fractured condition and it allowed the PUR to migrate and either fill the neighbouring holes before you actually got there to inject them, or they couldn't seal the hole, so they put the packer in, injected it with PUR and it couldn't build up a back pressure and it was all basically pouring out around the hole like a sieve. Either way, both scenarios for the square symbols on that graph indicate, in conjunction with 180 litres, that this rock mass was in a highly fractured condition.

Q. The injection is from the face into the roof?
A. Yes.

Q. So if, as you say, some holes were unable to be sealed and there was leakage, it would be leakage at face level; am I right?
A. I would say probably, because you wouldn't know otherwise. If it was leaking somewhere else, you know, back over the top of the shields, you wouldn't know that. So it would be something where the operators could see that they're not building up back pressure and they can see that this PUR is leaking out around it. They'd stop the injection.

Q. Any leakage on to the face would, as I think you identified earlier, have been mined through subsequently?
A. Correct, yes.

Q. You've done some more schematics. Mr Operator, could we have document RSH.022.004.0001. These are illustrations that you've drawn, as the title indicates, to depict a sectional view of the face and the roof at chainage 3990?
A. Yes, yes.

Q. For the first diagram - perhaps we'd better enlarge, if we can, the first section. That's said to be a sectional view looking towards the tailgate from shield 111. Does this then incorporate some of the features that you've referred to earlier, being the existence of the MP sandstone, the reverse fault and so forth?
A. I've tried to encapsulate everything as I think - obviously in a schematic sense - what it would have looked like immediately prior to the ignition.

Q. We see from the coloured areas behind the shield some yellow and some blue, which according to your key indicates the presence of a PUR and void fill. Now, the void fill, as we noted earlier, covered a distance or a width corresponding to about five shields, whereas the PUR was present across from 97 to 132. So although that depicts a sectional view at shield 111, do we take it that all points from shields 97 to 132 were likely to have PUR behind the shields at chainage 3990?
A. Correct. Yes.

Q. If we could go back to the page, Mr Operator, and look at the second illustration, that's said to be from shield 130 looking towards the tailgate. You haven't drawn any PUR, but would you expect there to have been PUR on that?
A. If we're at 132, yes

Q. I beg your pardon?
A. If the PUR went to 132, then yes. Did the PUR - yes, yes.

Q. Okay. Well, the third drawing is from shield 147. There's no PUR applied in that area; correct?
A. No.

Q. There was, however, I think a cavity. Is that what's intended to be depicted above the shield at that point?
A. Correct, yes.

MR RICE: There are some other schematics, but to be honest, I think we've discussed them in another form or discussed them by reference to another copy.

Those are my questions, Mr Martin.

THE CHAIRPERSON: Mr Holt?

MR HOLT: No questions, thank you, Mr Martin.

THE CHAIRPERSON: Mr Crawshaw?

MR CRAWSHAW: No questions, Mr Chair.

THE CHAIRPERSON: Thank you. Ms Grant?

MS GRANT: No questions.

THE CHAIRPERSON: Mr Boyd?

MR BOYD: No questions.

THE CHAIRPERSON: Ms Holliday?

MS HOLLIDAY: No questions.

THE CHAIRPERSON: Yes, Mr Clough.

MR CLOUGH: Q. Mr Thomas, just one question. I'm curious. You've had previous experience with the Goonyella Middle seam in your line of work?
A. Yes, but I wouldn't say a lot. I have got experience in the Goonyella Middle seam, yes, but not a lot.

Q. I was curious whether or not you had heard of or had any involvement with a goaf fall of this magnitude previously, as has been reported?
A. In the Goonyella Middle seam?

Q. Yes.
A. Not to my knowledge. I can't think of anything like that, no.

MR CLOUGH: That's all I wanted to know. Thank you.

THE CHAIRPERSON: Mr Rice, anything else?

MR RICE: Nothing arising, Mr Martin. Could Mr Thomas be excused?

THE CHAIRPERSON: Yes. Mr Thomas, thank you for your attendance. You are excused.

<THE WITNESS WITHDREW

MR RICE: That's the witness for today and was indeed for tomorrow, Mr Martin, so perhaps the Board would resume on Wednesday morning?

THE CHAIRPERSON: Yes, all right.

Perhaps I should indicate - and this is no criticism - it was expected that there would be some cross-examination, some substantial cross-examination, and hence the earlier than usual adjournment, Mr Rice?

MR RICE: Yes, quite so, Mr Martin.

THE CHAIRPERSON: All right, we will adjourn until Wednesday at 10 o'clock.

AT 2.38PM THE BOARD OF INQUIRY WAS ADJOURNED TO WEDNESDAY, 17 MARCH 2021 AT 10AM

B

D

E

F

H

I

J

K

L

M

N

O

T