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 Tuesday, 9 March 2021 at 10am
(Day 14)

THE CHAIRPERSON: Ladies and gentlemen, good morning. Could I have appearances, please.

MR J R HUNTER QC: May it please the Board, my name is Hunter, initials JR, of Queen's Counsel. I appear as counsel assisting with my learned friends Mr Rice, initials GR, of Queen's Counsel and Ms O'Gorman, initials RM.

MR S C HOLT QC: My name is Holt, initials SC, of Queen's Counsel. I appear with my learned friend Ms Freeman, initials AC, of counsel. We appear for the Anglo entities to whom leave has been granted to appear. We are instructed by Ashurst, may it please the Board.

MS D A HOLLIDAY QC: If it pleases the Board, my name is Holliday, initials DA, of Queen's Counsel. I appear with my learned friends Mr Dollar, initials LM, and Ms Taylor, initials RC, instructed by Resources Safety & Health Queensland for Resources Safety & Health Queensland.

MS C J GRANT: My name is Grant, initials CJ, of counsel, instructed by Rees R & Sydney Jones, appearing on behalf of injured coal miner 2 and injured coal miner 5.

MR J P D TROST: May it please the Board, my name is Trost, initials JPD. I appear on behalf of injured worker 4. I appear instructed by Kartelo Law.

THE CHAIRPERSON: Mr O'Brien?

MR A I O'BRIEN: May it please the court, my name is O'Brien, initials AI. I am instructed by McGinness & Associates. I appear on behalf of 29 coal mine workers for whom leave has been granted to appear before the proceedings. I have a list of those workers.

THE CHAIRPERSON: Thank you, Mr O'Brien.

MR S CRAWSHAW SC: If the Board pleases, appearing by video, my name is Crawshaw, initial S, of senior counsel. I appear for the CFMMEU together with Mr Anderson, initial R, from the union.

THE CHAIRPERSON: Thank you, Mr Crawshaw. Is there anyone else to announce appearances? Thank you. Yes, Mr Hunter.

MR HUNTER: May it please, in the absence of any

preliminary matters, I propose to outline in some detail the evidence that is proposed to place before the Board over the next few weeks. There apparently being no preliminary matters, I will proceed to do so now.

It was identified in opening remarks at the first tranche of the Inquiry's public hearings that consideration of the nature and cause of the serious accident at Grosvenor mine would need to await the gathering of further evidence. This was to include analysis and opinion by a variety of experts. Inquiry into the HPIs at Grosvenor mine was deferred for the same reason.

Since then, the inspectorate's investigation has progressed substantially, although it is not yet concluded. A body of evidence comprising a range of expert opinions in a variety of disciplines relevant to an assessment of the explosion at Grosvenor mine and its possible causes has become available. As a result, the Board is now able to pursue the terms of reference that require it to inquire into the serious accident and the HPIs.

On 6 May 2020 five coal mine workers were carrying out mining duties at the longwall 104 face. The serious accident involved a methane explosion at about 2.57pm, which caused those five workers to suffer burn injuries. The injured coal mine workers were situated between about shields 100 and 132, that is, towards the tailgate end of the longwall. Other workers situated at or towards the maingate and elsewhere were not injured.

The fact of the injuries demonstrates the presence of an explosive mixture of air and methane towards the tailgate end of the longwall face at that time, despite the ventilation and other controls the mine had put in place in an attempt to guard against such an occurrence.

There must also, though, have been a source of ignition present to cause the methane mixture to explode, and so the two fundamental questions are therefore: how did an explosive mixture of air and methane come to be on the longwall face at that time; and what was the source of ignition?

It is intended now to commence this set of public hearings with an introduction to the evidence that is expected to be heard on these issues. The explosion cannot

be understood as an isolated event. As the Board knows, over the relatively short period it was in operation, longwall 104 accumulated 14 methane exceedance HPIs. Those HPIs on longwall 104 were preceded by another 13 on longwall 103 between 2 July and 7 November 2019, and, further, those 13 HPIs on 103 were themselves preceded by multiple similar events on not only longwall 103 but also 102 and 101.

Methane exceedance HPIs at this mine had been the subject of repeated discussions between members of the inspectorate and mine management.

It is at least arguable that the events of 6 May 2020 were a further manifestation of Anglo's ongoing inability to safely manage methane at Grosvenor. Now, that senior management at Grosvenor knew that there was a problem cannot be doubted.

On 1 May 2020, five days before the explosion, in an email sent to the senior leadership team, site senior executive Trent Griffiths said this:

> *Unfortunately despite a rather small longwall 104 goaf and gas reservoir, the methane levels in the tailgate are almost to the point of bordering on unmanageable.*

The following day, 2 May, he wrote:

> *For one reason or another, a combination of the directive on the 2 per cent armoured face conveyor and a BUCKET load of gas in a rather small goaf, we are losing the war and are at risk of losing this longwall.*

The word "bucket" was capitalised, underlined and in bold.

Four days after he sent that email, the explosion in the tailgate that prompted this Inquiry occurred.

Now, having said that, it may be that the Board will, in the end, not be able to reach definitive conclusions about how the explosive mixture came to be on the longwall face or, indeed, what ignited it. The evidence does, however, point fairly clearly towards coal heating activity in the longwall 104 goaf. This evidence was abundant after

the 6 May accident, but there were also indicators that accelerated coal oxidation was occurring within the longwall goaf prior to 6 May. That heating may have been occurring deep in the goaf and it also may have been occurring in the roof above or the goaf immediately behind the longwall shields. A localised heating may have been induced by the exothermic reaction caused by the use of polyurethane resin, or PUR, to consolidate the longwall face and roof.

Accordingly, a spontaneous combustion event may well be responsible for the ignition, and the presence of methane on the face may be explicable by its ubiquity in the tailgate at this particular mine, a substantial fall of strata into the goaf that caused a windblast or perhaps even an ignition deeper in the goaf.

Matters that will arise for the Board's consideration include the following: whether the goaf was being appropriately managed in terms of properly minimising the ingress of oxygen at the goaf seals; whether the mine's ventilation system, which involved a downcast fan at the rear of the goaf, may have led to the leakage of air past the goaf seals and otherwise contributed to the ingress of oxygen to the goaf; whether the goaf drainage system itself was adequate for the task and the extent to which the senior leadership team was well aware of its lack of capacity; whether the goaf drainage system was drawing gas out of the goaf at such a rate as to cause the ingress of ventilation air and thereby oxygen; whether the risk of spontaneous combustion posed by the goaf drainage wells was addressed sufficiently, or even at all; whether the risk of spontaneous combustion caused by the exothermic reaction associated with the use of PUR was properly considered and addressed; whether the strata conditions in the inbye end of longwall 104 were given sufficient attention in the planning of the longwall panel, including whether the panel ought to have been commenced in the location where it was in the first place; the sufficiency of pre-drainage of methane, particularly from the P seam; whether a reliance on methane post-drainage rather than pre-drainage contributed to the difficulties in managing tailgate gas emissions and high oxygen levels within the goaf; whether the gas monitoring regime, including the spontaneous combustion trigger action response plans, were adequate and, even if they were, were sufficient samples being taken and analysed; and, lastly, whether the Queensland Mines

Inspectorate adequately responded to the reporting of these 27 HPIs, particularly given the history of similar events at this mine.

Now, it's emphasised that these matters have been identified by counsel assisting as being proper subjects for the Board's consideration. It is not suggested that there is at present a concluded view that adverse findings should be made in respect of any of them. What will occur is that the evidence dealing with those matters will be placed before the Board.

Now, a logical place to commence with what occurred with respect to the serious accident is the accounts of the coal mine workers about what they experienced concerning the explosion. The accounts given by such of the injured coal mine workers who have been able to describe the experience is, of course, highly relevant. So too are the accounts by other workers who were underground at the time in the maingate, the crib room and elsewhere. Workers who were able to do so gave an initial brief statement in writing about the event at the mine shortly after they reached the surface. Many were subsequently interviewed by members of the inspectorate.

These accounts provide an important resource against which to evaluate possible answers to the two fundamental questions.

Excerpts of the workers' statements and interviews have been prepared and will form part of the evidence to the Inquiry. Without prejudice to a more detailed consideration of these accounts, a number of features emerge.

Coal mine workers underground at the time of the accident experienced pressure waves. Taking the descriptions given by workers at various underground locations, the preponderance of evidence discloses that there were two pressure waves. Some, but few, spoke of three pressure waves.

As to the force of those pressure waves, it is noted that a worker at number 6 cut-through stated that he experienced two pressure waves and his ears popped. Six cut-through is located 3.5 kilometres from the face.

From the descriptions given by coal mine workers at and about the face at the time of the serious accident, the preponderance of evidence discloses firstly that there were two significant pressure waves, each with sufficient force to be capable of knocking workers off their feet. Secondly, the second pressure wave was greater than the first. Thirdly, the two pressure waves were separated by an interval of roughly 10 to 15 seconds. Fourthly, these pressure waves were unique in their intensity when compared with what the coal mine workers had previously experienced in their careers concerning similar events.

It should also be mentioned that the accounts are to the effect that these pressure events occurred very suddenly and without warning.

The injured workers were transported to the surface by colleagues and taken from there to hospital. The first inspector to the scene was Inspector Matthew Kennedy, who just happened to be in Moranbah that afternoon. After making initial inquiries and in consultation with the chief and deputy chief inspectors, a directive was given at about 6.15pm suspending mining operations and directing that no-one was to return underground.

A variety of inspectors attended the mine over ensuing days and weeks to commence undertaking the investigation.

Ultimately, though, on 6 June 2020, conditions on longwall 104 deteriorated to the point where it became clear that a heating was in progress, and the Anglo IMT restricted entry to the underground workings to workers undertaking critical tasks.

The next day, 7 June, when things had not improved, changes to mine ventilation were proposed, and those changes were completed by 1.15am on 8 June, after which all underground access was prohibited.

Notwithstanding the change, at some point between 2.45am and 3am that morning there was an overpressure event, or in other words a methane explosion caused by spontaneous combustion. There has been no access to the underground workings since that time.

Quite apart from the workers' accounts, there would

appear to be good indicators in the evidence that the presence of an explosive mixture of methane at the longwall face was a sudden and discrete event and not a gradually rising level of methane.

In support of that, data from the gas sensor installed on the 149 shield, which is the last shield, at the tailgate recorded a near instantaneous increase in methane concentration on the longwall face at 14:57. The methane measurement on that sensor flatlined at 4.3 per cent, but it seems inevitable that that sensor was poisoned and the real concentration was 5 per cent or more, otherwise the explosion simply wouldn't have propagated to that point.

There was also noted to have been an increase in the pressure on the legs of some of the shields. Data concerning that particular aspect of the mine's operation is kept on a system called Citect, which is a supervisory control and data acquisition system which measures a whole range of activities at the mine, but in particular, for present purposes, the leg pressure on the shields.

An extract of that data between 14:56:24 and 14:56:47 shows the tailgate shields were reading less than 350 bar pressure, indicating that there was no competent roof to set the shields against. This may well be attributable to a cavity in the roof of the tailgate area at the time.

But at approximately 14:57:25 there was a sudden increase of 10 to 30 bar in leg pressure measured on shields 139 to 149, so again at the tailgate. That equates to an increase of 100 to 300 tonnes per square metre of additional load and is consistent with a sudden failure of strata from an overlying cavity.

The timing of the increase in leg pressure also coincides with significant changes in fan pressure at the air intake shaft for the longwall, which was located immediately behind it. That shaft, number 9, fan pressure is measured on Citect, and at the time of the event that number 9 shaft was in forcing configuration, hence the pressures that were recorded were positive. Consistent with the experience that the majority of workers recounted, namely, that there were two overpressure events, the number 9 shaft collar pressure showed two significant reductions in fan pressure 16 seconds apart, at 14:57:30 and 14:57:46.

Now, early in the investigation, the longwall was examined for indicators of the extent of the fire underground. Murray Nystrom is a forensic investigator with a long history in fire and explosion investigations. He was engaged to conduct an examination of the longwall face and attempt to determine the nature of the fire which caused the burns to the injured workers.

He was also tasked with attempting to determine the likely area from which the fire originated.

He attended Grosvenor mine on 8 and 10 May 2020. On the 8th he examined a number of items of clothing which were recovered from injured workers. From observations of the clothing, he was able to conclude that the incident at the face involved sudden heat of sufficient temperature to melt light synthetic fabric and cause some ignition. The temperatures involved would have been more than 200 degrees Celsius and up to several hundred degrees Celsius.

By 10 May a plan had been formulated for re-entry to the mine for investigative purposes. Mr Nystrom, along with the inspectors and some Anglo staff, visited the longwall that day to conduct an examination and he took a range of photographs that will be tendered, or some of them will.

As to the extremities of the fire damage, Mr Nystrom observed that there appeared to be no damage to the shields from the maingate until shield 100. From that point, towards the tailgate, the damage was increasingly evident to shield 111, which appeared to have sustained the most damage, but damage was also evident on the shields further towards the tailgate.

Mr Nystrom looked for indicators of the direction of flame, and between shields 100 and 111 burn patterns on individual items suggested that the flame had travelled from the direction of the tailgate towards the maingate, but, by contrast, from shield 111 the burn pattern suggested the flame travelled from the direction of the maingate towards the tailgate, so that the fire front was bi-directional, centring on shield 111.

From these observations of the relative damage to particular shields, their equipment and the apparent direction of flame travel, Mr Nystrom's opinion is that the

fire most likely entered the longwall in the area of shield 111. There were, he will say, no features arising from his examination of the items of clothing and equipment which detracted from the conclusions that he drew from the underground examination.

As identified earlier, the first issue is how did an explosive mixture of methane in air come to be on the longwall face at that time?

There are various features of the evidence which invite inquiry into whether the event involving the explosion was associated with a phenomenon called windblast or airblast. Those features have already been referred to, namely, the workers' accounts of two pressure events, each of which was of sufficient force to be capable of knocking workers off their feet; contemporaneous increase in the shield leg pressure indicating a strata fall to some degree; and contemporaneous changes in fan pressure from shaft 9 and, to a lesser extent, exhaust fan shaft 6 located some distance away.

A windblast could be the result of a goaf fall or it could be the result of a pressure wave associated with a methane ignition.

A description of a shock wave associated with a methane ignition was documented in the New South Wales Government investigation into the report of a fire and explosion on longwall number 1 at the tailgate at Blakefield South mine on 5 January 2011. One of the miners involved described what occurred in these terms:

> *"Then there was a massive windblast. Huge. It blew totally against natural ventilation of the mine. Air comes in the maingate, across the face, out the tailgate. It blew outbye, across the face and back up the belt. Never quite blew us over, but if you didn't brace yourself it would have". The deputy said. "It was rather large. Very unexpected. Within seconds of the blow was the big suck back. The suck back was stronger than the blow.*

A description of what is involved in a windblast from a goaf fall was given by the authors of a study in 2000

called the Dynamics of Windblast in Underground Coal Mines, by Fowler and Sharma, who stated:

> *In some underground coal mines, where the roof comprises strong and massive rock, the roof strata do not cave regularly as extraction progresses but "hang up", leading to extensive areas of unsupported roof. These areas can collapse, suddenly and often without warning, compressing the air beneath and forcing it out of the goaf through surrounding openings giving rise to a phenomenon known as wind blast. The force of the wind can, and sometimes does, cause injury to mine personnel, disruption to the ventilation system and damage to plant and equipment.*

The authors identified that, "it is of particular concern that methane in explosive concentrations may be expelled from the goaf into the working place as a consequence of windblast". An explosion at Moura No. 4 mine in Queensland where 12 miners were killed in 1986 was cited as an example of such an event.

In 2007 the New South Wales Department of Primary Industries produced a windblast guideline, which I'll refer to as "the 2007 guideline". The 2007 guideline defines windblast by reference to a threshold air velocity of 20 metres a second, being the velocity at which the air movement is sufficient to knock a person from his or her feet.

There is evidence that the pressure events that occurred at Grosvenor mine had that capability, but it is not likely to be important to attempt to determine velocity. "Airblast" is a term applied to some lesser but still significant events of that kind, and during the Inquiry it's likely that those terms will be used interchangeably.

Now, Mr Rob Thomas will be called. He's a geotechnical engineer with over 30 years' experience in that field, particularly in the underground coal mining industry, with particular experience in the fields of roadway support systems, mine design and longwall geomechanics.

Mr Thomas was engaged by the inspectorate to review the geotechnical environment and the prevailing ground conditions on the lead-up to the methane ignition event which occurred on 6 May. He has considered a wide range of geotechnical data associated with Grosvenor mine for the purpose of preparing a number of expert reports. He considered in particular whether circumstances existed to make it plausible that at least one of the pressure events was caused by an airblast. He has not considered whether an explosion of methane is also capable of causing a pressure event such as that that the workers described, because it is not within his area of expertise. That will be addressed by others and consideration of that issue ultimately will fall to the Board.

Mr Thomas identified the key geotechnical features associated with airblast as: one, thick and competent rock types in the near-seam overburden that had the potential to span and fail en masse some distance into the goaf; and, two, a limited thickness of interburden between the extraction horizon and the base of the spanning unit, such that a pathway exists for the goaf gases to displace into the mine workings.

His report identifies that the pathway required for the goaf gases to displace into the mine workings would require the presence of an air gap between the goaf material and the base of the spanning unit, such that the overlying unit is able to detach and, in effect, freefall on to the goaf material below.

As to what constitutes a thick and competent rock type having the necessary spanning potential, Mr Thomas noted that the 2007 guideline specifies massive units in excess of 10 metres in thickness. That criterion is qualified by the statement that "irregular windblast events can also occur when thinner beds exist".

The first phase of Mr Thomas's assessment was to examine the stratigraphy above the GM seam - that's the Goonyella Middle seam of Grosvenor mine - to determine whether there was evidence of a thick and competent rock type qualifying as a massive unit with potential to span into the goaf and detach.

It's likely to be uncontroversial that three channels

of sandstone exist above the GM seam. Diagrams will be produced in due course. These channels of sandstone are, in ascending order in terms of height above the GM seam, the MR sandstone, the MP sandstone and the PP sandstone.

Mr Thomas will have some schematic illustrations of his findings, but his conclusion from assessment of the available data is that at the location of the accident the MP sandstone fits the criteria of being a thick and competent unit which would be expected to retain some spanning ability and so behave as a cantilever when located in the goaf.

Mr Thomas notes in particular that at the location of the accident, the MP sandstone channel is 32 to 35 metres above the GM seam and is between 15 and 22 metres thick. It has a rock strength rating that puts it in the upper level of the moderately strong range.

By way of comparison with previous longwalls, the MP sandstone was not present in the first 400 metres of retreat of longwalls 101 and 102. Over the first 400 metres of longwall 103, the MP sandstone was there but it was of a lesser thickness than at longwall 104, and it was also more distant from the GM seam.

Thus Mr Thomas points to the features that at the location of the accident the MP sandstone is at its thickest and is closest to the seam than in comparable locations on previous longwalls.

In short, he advances the proposition that at the location of the accident, a thick and competent rock type existed at a reasonable distance above the GM seam, and that the MP sandstone was either not present or not present to the same degree over the first 400 metres of retreat of previous longwalls.

An additional feature of significance is that the longwall 104 face profile was mapped by the mine geologist on 4 May 2020 when the longwall tailgate chainage was 3998 metres. Of note is a reverse fault of 400mm that was mapped at the tailgate end. It was subparallel to the face and dipping into it.

Using diagrams, Mr Thomas will illustrate the geotechnical significance of the reverse fault. His

assessment of its relevance is that the reverse fault was not only mapped at a subparallel, and therefore unfavourable, angle to the longwall face but it was also located at the tailgate end of the face, that is, at the area where the ignition occurred, and, more critically, dipped into the face, thereby increasing the potential for sudden block detachment once the fault was located inbye of the supporting influence of the longwall shields.

Accordingly, the location of the reverse fault was another circumstance which could have aided in a sudden detachment of a cantilever of rock above the face extending into the goaf.

But as stated above, more is required than a simple fall of that cantilever of rock. What is needed is a flow path for the expelled gases from a strata collapse to reach the mine workings.

The GM seam was being cut to a height of approximately 4.2 metres from about 100mm above the floor. Thus the action mining the seam creates a void of 4.2 metres, which was to be filled by the collapse of material overlying the seam through the process of goafing.

Consideration of whether an air path could have existed between the MP sandstone and the goaf material at the location of the accident requires some understanding of the concept of bulking factors.

Mr Thomas's evidence will be that when the overlying material collapses without the supporting influence of the shields, it can be expected to bulk up, which is to say it will expand in volume when compared with intact rock. As to the expected ratio of expansion, Mr Thomas says, as a general rule, bulking factors range between 1.1 and 1.3 for weak mudstone and siltstone rock types and 1.5 for more competent sandstone rock types.

Mr Thomas assesses that for the first 400 metres of retreat of longwall 104, the interburden between the GM seam and the base of the MP sandstone is dominated by more silty strata than compared to longwalls 101 to 103. Accordingly, it would be expected to bulk up to a lesser degree in the goaf.

Having regard to that lesser bulking of the strata

overlying the GM seam in the first 400 metres of retreat, Mr Thomas calculates that the conditions were right for the existence of a void between the top of the goaf pile and the base of the sandstone.

Mr Thomas also notes that in the last 12 metres of retreat of the longwall before the incident, a number of 2 to 5 metre high cavities were noted in the tip-to-face area between shields 108 and the tailgate. These were mapped by the mine geologist. The effective height of extraction in the location of these cavities would have ranged between 6 and 9 metres, which means that there was less bulked material in the goaf, and, in his view, those matters increased the likelihood of an air gap through which an explosive mixture could pass on to the workings at the face.

Mr Thomas has expressed his conclusion in these terms: the reported airblast relates to the coexistence of three geotechnical anomalies, namely: one, a thick spanning sandstone unit in the near-seam ovberburden; two, a fault, probably the reverse fault, which caused the sandstone to fail suddenly and fall onto the goaf material below; and, three, the limited amount of bulked material in the goaf which thereby created a pathway for the goaf gases to pass through and onto the longwall face.

Now, Grosvenor did have a hazard management plan for longwall 104 in relation to the phenomenon of windblast, but only with respect to the initial caving of the goaf, which was anticipated to occur within the first 10 to 70 metres of retreat.

The experience from longwalls 101, 102 and 103 was that goaf formation occurred at between 15 and 20 metres from start-up.

Accepting that the longwall 104 secondary extraction risk assessment and the longwall 104 first goaf risk assessment did acknowledge the potential for windblast, albeit in the context of first goafing, Mr Thomas ventures two further points: those documents were not substantiated by any rigorous geotechnical studies into the likely caving behaviour of the near-seam ovberburden in the inbye area of longwall 104; and, more specifically, the mine did not assess the spanning ability of the MP sandstone and the potential significance of this unit with regard to airblast

and airblast-related expulsions of methane into the mine workings.

A geological and geotechnical hazard plan for longwall 104 was included in the second workings standard operating procedure for longwall 104. Mr Thomas observes that the geophysical strata rating included in the hazard plan terminated at a height of 40 metres above the GM seam. In doing so, it only exposed the lower 5 or so metres of the MP sandstone.

So this indicates that there appears to have been a focus on the issue of immediate roof control, and that the spanning potential of any strata units located more than 30 metres above the extraction horizon were not rigorously considered.

Mr Thomas will accept that his conclusions about the occurrence and the cause of an airblast are not, by their nature, capable of definitive proof, but he considers that circumstances were in existence that align with his postulation, and his evidence will provide for an opportunity for those conclusions to be tested.

Mr Thomas's view of the likely cause of the presence of methane on the longwall face finds support from consultant mining engineer Andrew Self, whose view is that the most probable cause of the methane/air mixture on the longwall face was a large goaf fall, as evidenced by observation of fan pressure fluctuations.

The second fundamental issue concerns potential sources of ignition, and there is evidence bearing upon the likelihood of a number of them, and they are principally frictional ignition, electrical fault, a spontaneous combustion event and static electricity.

I will deal firstly with frictional ignition. Frictional ignition can be considered really in two contexts. The most usual one is the risk of frictional ignition from the action of the shearer cutting into rock. Much less common is the possibility of frictional ignition associated with strata collapse by way of rock on metal or rock on rock impacts.

Now, it would seem that the action of the shearer cutting into sandstone at the floor or roof horizon can be

disregarded as relevant to the explosion at Grosvenor. The shearer was not cutting at the time of the incident, and there is evidence that it had been parked at approximately shield 120 from 2.25pm, or about half an hour prior to the incident.

To assist with the assessment of other possibilities, the inspectorate engaged Dr Ray Low of the University of Queensland's materials engineering consultancy, Materials Performance, to conduct a literature review into the plausibility of mechanical interactions causing the Grosvenor mine explosion.

Dr Low's literature review concluded in part that: firstly, a sizeable rock fall in the goaf could create a significant windblast of explosive gas into the working area of the longwall; and, secondly, rock falls in the goaf can lead to extremely dangerous atmospheric conditions in a longwall due to the combination of potentially high wind speeds combined with explosive methane concentrations.

Dr Low found numerous past instances of ignitions caused by tools or coal-cutting machinery hitting rock, but also found that explosions caused by rock on rock interactions from falls in the goaf were rare or had been rarely identified. Explosions caused by the phenomenon of rock falls had not been reported in Australia, although there had been various reports of it having occurred overseas.

The review identified past experimental studies conducted into the potential for ignition of methane from rock on rock and rock on steel frictional interactions. Those studies indicated the possibility of achieving ignition in specified conditions of sliding or impact friction. However, in both categories of experiment, the key factor influencing incendivity of such interactions was the rock composition.

Through the work of Ward and others from the University of New South Wales, a five-point ignition categorisation system for rocks is in place in Australia. It is also known as an IGCAT. It's used as a measure of incendivity.

Ward explained the classification scale as follows: a high ignition category, 4 to 5, from this program

indicates a relatively high potential for frictional ignition; a low value, 1 to 2, indicates a significant degree of difficulty in obtaining frictional ignition under the test conditions.

Geochempet Services Pty Ltd operates a petrographic geological and geochemical consultancy. As part of the inspectorate's investigation, core samples from two boreholes at Grosvenor mine were supplied to Geochempet for examination. The object was to determine the incendive sparking potential of the samples in accordance with the methods and classification developed by Ward and others.

Now, nine rock samples were tested from borehole DDG214 and seven from borehole DDG295. 214 is located near to the mined area of longwall 104, whilst 295 is located within the mined area.

Longwall 104 was mining the GM seam at a depth of 390 metres. Seam thickness was approximately 5.6 metres and it was being cut, as I've already said, at a height of 4.2 metres. The samples were taken from a range of depths above the level of the GM seam.

The test results will be adduced in due course, but the conclusions were these. For borehole DDG214, the rock samples from depth between 357 and 387 metres were of low incendive quality. Above that, between 341 and 345 metres, there was a mix of low to mid-range incendive quality rock. No samples were in the higher categories.

For borehole 295, rock samples taken from a depth of between 367 and 384 metres were of low incendive quality, and above that, between 341 and 350 metres, the rock was a mix of low to mid-range incendive quality. Again, no samples were in the higher categories.

These results are consistent with the mine's own testing, by Geochempet, as it turned out. That testing assessed the incendivity of samples of rock from a number of different boreholes, and the test data is in the mine's hazard management plan for the control of frictional ignition.

I won't go into the detail presently, but there were six samples, and four of them were assessed in category 1, and two were assessed in category 2.

In August 2020, that's after the explosion, Grosvenor conducted a risk assessment, the object of which was to consider any available learnings thus far following the gas ignition event that occurred on 6 May and the spontaneous combustion event of June 2020.

That assessment rated the risk of rock on rock friction from a roof fall or caving of the goaf as low having regard to - I'll use the terms of the risk assessment - "low incendiary sparking potential of strata - Exploration coring (data cutting horizon) - IGCAT (frictional ignition potential (testing)".

Thus, the evidence points away from rock on rock frictional ignition as a cause.

In circumstances under consideration, the scenario of rock on metal ignition would appear to be limited to rock falling onto the shields as indicated by the increasing leg pressure on a number of the shields referred to earlier. The likelihood of ignition from that source would appear to be low for the same reason, that is, because of the low incendiary sparking potential of the strata.

The electrical equipment at the mine, or I should say some of it, was subjected to removal and testing. Mr Neville Atkinson is a senior inspector of mines within the electrical discipline and he supervised the examination and testing of equipment from the longwall. He went underground on 10 May and inspected the longwall whilst Mr Nystrom was conducting his investigations and he returned underground on 20 May, this time in company with the mine's own fire investigator, Graham Ray, for another inspection of fire damage and with a view to developing a plan for the selection and removal of electrical equipment.

Based on information received from both Mr Nystrom and Mr Ray that the fire likely originated at shield 111, he seized electrical components from shields 109 to 112. As he had earlier been made aware of a suggestion that the fire might have originated around shield 136, and because 136 was the last shield to be operated prior to the incident, he also seized the electrical components from shields 135 to 138.

Other items of electrical equipment from the longwall were also seized. That included the power supply units from 99 shield through to 144. These were chosen because they represented every power supply in the affected area and they provided the power to the solenoids, lights and sensors in the area.

All of those items were transported to Simtars, where they were examined to determine whether an electrical failure in one of them could have caused the fire. Testing of the electrical components at Simtars, which, I should have said, is the Safety in Mines Testing and Research Station, did not reveal any potential ignition sources in normal or fault-induced conditions, and there is an exhaustive report from the examiner.

The Board will hear, though, from a Mr Marty Denham, who conducts a consultancy in the areas of electrical equipment compliance and electrical fire and shock forensic investigation. He was engaged to oversee the method of testing of the electrical equipment and to provide an opinion as to whether any of the electrical components were likely to have caused the fire.

On 4 June 2020 he attended at Simtars and oversaw the testing of the equipment. He did not see any evidence that the equipment could have been the cause of the fire.

On 17 June 2020 he was asked to return and examine a damaged wire. Upon examination, he was able to conclude that the item showed no evidence of electrical activity or of being an ignition source.

Ultimately he concluded that the seized items showed no signs of a plausible electrical ignition of the fire.

Then there's static electricity. Dust gutters or guards were in place between the shield canopies on longwall 104. They're designed to funnel dust into the goaf away from the longwall face.

Inspector Atkinson deals with the potential for static electricity from the dust gutters, and his statement records that he was unable to obtain a sample of the dust gutter which was in place at the scene of the accident due to being unable to access the site after the second explosion.

The dust gutters were first supplied and installed at Grosvenor mine in 2017, and he requested that the operator of the mine provide a sample of that same material, but he was informed that there was none stored at the warehouse.

An investigation of the original documentation supplied to the mine confirmed that the type of material used had been tested to the requirements of the Australian standard, which is MDG 3608 4.2.2.1.

Now, also testing at Simtars of dust gutters supplied to Broadmeadow underground coal mine from a trial in January 2018, made and supplied by the same manufacturer, identified that this material met the electrical resistance requirements of the Australian standard.

Testing was conducted on a sample provided from the Moranbah North mine, which was from the same supplier. This sample was from a couple of years later than the 2014 testing, and testing at Simtars did identify that this sample, utilised by the same manufacturer of the dust gutters and supplied from Moranbah North mine, did not meet the resistivity anti-static requirements of the Australian standard.

But it has to be said that static electricity is associated with friction. If the point of ignition was at or near shield 111, potential for the dust gutters to create an ignition source would need to be considered in light of the fact that shield 111 was not in operation or moving, the last movement of any shield having been at shields 136 and 137, quite some distance away.

Could I then move to spontaneous combustion. I'm going to address that in two parts. Firstly, I am going to address spontaneous combustion generally and then address it in the context of the use of polyurethane resin, or PUR.

Now, mine management at Grosvenor were aware of the risk of spontaneous combustion. However, when the workplace risk assessment and control, otherwise known as a WRAC, for hazards associated with goaf drainage was completed on 27 February 2020 - and this is in relation to longwall 104 - it specifically did not address the risk of spontaneous combustion.

Endorsed on the document, which the Board will see in due course, were these words:

> *Increased spontaneous combustion risk due to increased gas drainage has not been assessed in this WRAC. Additional WRAC required to assess and control spon com risk.*
>
> *Action in Enablon ... to complete by 31 May 2020.*

I interpolate that Enablon is a software solution that enables the mine, amongst other things, to track the allocation and completion of tasks.

It perhaps need not be said that the date for completion of that activity came after the events of 6 May.

On 1 May, however, the site senior executive, Mr Griffiths, emailed the head of underground operations, Glen Britton, and the head of technical, Luca Rocchi, saying:

> *Please keep this to yourselves at the moment but next week we will be looking at increasing our goaf drainage capacity for 4-5 weeks.*

That email was sent in circumstances where the mine had specifically not conducted a risk assessment for spontaneous combustion from increased goaf drainage.

There's a wealth of data available about the mine atmosphere, both before and after the explosion, and a detailed analysis of that data has been undertaken by Martin Watkinson and Sean Muller, both of Simtars.

Mr Watkinson is an experienced and well-regarded technical manager and underground coal mining engineer. In addition to his work for major mining companies, he has also worked internationally as a consultant. He is currently the executive mining engineer at Simtars and he provides technical advice on matters that include mine ventilation and spontaneous combustion.

Gas monitoring at the mine included real-time sensors

that could detect a suite of four gases, those being methane, oxygen, carbon monoxide and carbon dioxide.

There were real-time sensors that were capable of detecting a single gas, in most cases methane, and there was a tube bundle system that continually drew gas by vacuum from sample locations throughout the mine to a central monitoring point, where the gas could be analysed for those four gases or potentially, using a gas chromatograph, for a whole suite of gases.

The point needs to be made, though, that the tube bundle system suffers from the deficiency that it constantly identifies different locations from which to sample, and it also takes a significant period for a sample to be drawn from the sample point to the central location where the testing is done, so there can be a time lag in excess of an hour.

Now, those three forms of monitoring - that is, monitoring for the four gases that I spoke about - were incorporated into a software solution called Safegas. It allowed for real-time display of gas concentrations, for ratios and for the sounding of alarms.

In addition, there was monitoring capability with respect to goaf wells, that is, wells that were sunk from the surface into the goaf to draw gas out of the goaf.

In the case of longwall 104, the goaf wells were sunk into the tailgate side of the goaf at intervals of about 25 metres, and they were equipped with sensors that transmitted that same four-gas data in real time to Citect.

Lastly, bag samples were manually collected, either from tube bundle points or from specific locations throughout the mine, including goaf wells. Those bag samples were subject to analysis by gas chromatograph, as I said. That device is capable of detecting the full suite of gases that might comprise a sample, including ethylene, one of the harbingers of spontaneous combustion.

It is important to note that ethylene is not a seamgas and it is not generated by any mining process.

A spontaneous combustion can occur when coal is exposed to oxygen. The process of oxidisation generates

heat and liberates certain gases, including carbon monoxide and ethylene. If the oxidation process continues and there is insufficient cooling by way of ventilation, the coal can ignite. Coal oxidation in the presence of an explosive mixture of methane in air can lead to an explosion.

A spontaneous combustion of coal from the Goonyella Middle seam is documented as having occurred at underground mines at North Goonyella and at Moranbah North.

The heating of coal progressively results in the production of particular gases at certain temperatures. The sequence of gas production and the temperatures at which they are produced are coal specific, but they generally commence at lower temperatures with CO2, followed by carbon monoxide, methane, hydrogen, ethane and ethylene and then higher hydrocarbons.

So the objectives of monitoring gas levels include the detection of potentially explosive atmospheres and the detection of gases liberated by a heating. The monitoring process includes not only the raw gas levels but also how the concentrations of certain gases compare with those of others.

Commonly used ratios include Graham's ratio, which compares the concentration of carbon monoxide with the amount of oxygen that has been depleted by the oxidation process. Another ratio compares the relative concentrations of carbon monoxide with carbon dioxide. A further important measure is not just the concentration of carbon monoxide but how much is being generated, and that's known as CO make.

The gas concentrations, the ratios and CO make are picked up in the mine's trigger action response plans, which specify that certain things should happen when trigger points are reached. Grosvenor had TARPs for spontaneous combustion that identified trigger points for the longwall return, the goaf seals and the goaf wells.

The TARP for the longwall return, however, specified a level 1 trigger point for the carbon monoxide to carbon dioxide ratio of 0.2, as opposed to, it's suggested, 0.02. As a general guideline, although coal specific, a coal that has generated a CO/CO2 ratio of 0.2 can be expected to be at a temperature above 100 degrees Celsius.

The goaf stream is an important place for the detection of products of potential heating of coal. Although there was a review of the mine's TARPs for spontaneous combustion by Serinus in January 2020 that recommended that there be a specific TARP for the goaf stream - that is, for the stream of gas emitted from the goaf at the tailgate end of the longwall - no goaf stream TARP had been introduced by the time of the accident.

Mr Watkinson reviewed the real-time and tube bundle data within Safegas, as well as the Citect data from goaf wells. His evidence is detailed and will involve the production of a large number of graphs, but his conclusions are essentially these: the real-time goaf data do not show any abnormal activity, but the tube bundle data do show some signs of spontaneous combustion, although nothing of the magnitude of what was observed in the lead-up to the ignition on 8 June.

It is important to the note there, or to pause there and observe that Mr Watkinson's opinions expressed there were confined to his analysis of the data that related to the gases carbon monoxide, carbon dioxide, methane and oxygen.

Now, he will say that, in his opinion, the tube bundles situated at the goaf seals showed levels of oxygen that were consistent with fresh air for substantial periods of time. That suggested that fresh air from ventilation in the perimeter road was getting past the goaf seals into the goaf. Those same tube bundles also showed the presence of CO, arguably present as a result of the oxidisation occurring from the ingress of fresh air. In his view, there is clear evidence that a heating of coal was occurring in mid-April.

He also looked at the goaf wells. The goaf wells were numbered in sequence from the furthest point inbye. Well 10 was situated essentially on the face or, if not, very close to it, followed by 9.5, which was 25 metres back, then well 9, 8.5, 8, 7.5, and so on.

Many of those goaf wells were drawing appreciable amounts of oxygen from the goaf for long periods of time, including on 6 May. Hence the question posed at the outset about the risks of spontaneous combustion posed by the high

rates of goaf drainage.

Sean Muller is an analytical chemist employed at Simtars. He has 10 years' experience in analysing underground atmospheres for the presence of spontaneous combustion indicators. His work concerned the analysis of the gas chromatograph data from bag samples taken underground and at the goaf wells, and he also analysed the raw data from the goaf wells as well.

The effect of his evidence is that throughout the operation of longwall 104, there were continual indicators of spontaneous combustion activity. Ethylene in trace amounts, less than one part per million, was regularly detected in the goaf stream, at goaf seals and in goaf wells.

Now, these quantities were at levels that were not automatically detected by the gas chromatograph and they went, in the main, undetected by the mine's gas chromatograph operator.

Furthermore, because of dangerous roof conditions in the tailgate, a number of samples of the goaf stream were not taken in the days leading to the explosion of 6 May.

Detailed analysis of data from the goaf wells, though, reveals not only troubling levels of oxygen but occasionally high amounts of carbon monoxide as well as concerning figures for both Graham's ratio and the CO/CO2 ratios.

Mr Muller concludes that there were signs of increased oxidation early in the longwall retreat, in late March, then again in mid-April, which happened to coincide with the PUR campaign about which I will speak shortly, and that data emerged from gas drawn from wells 6.5 and 7. Finally, he will say that there were signs of increasing oxidation evident from early May until the time of the ignition from wells 7, 8, 8.5 and 9.

The upshot of his evidence is that although the source of the ignition cannot be clearly identified as spontaneous combustion, there is tolerably clear evidence that heating activity was occurring in the goaf over the life of longwall 104.

Can I move now to the issue of spontaneous combustion potentially induced by polyurethane resin.

One of the issues to be considered during these hearings will be the relevance to the accident of the use of a large quantity of polyurethane resin to consolidate the face and roof at longwall 104 a few days before 6 May, in fact on the 3rd.

The use of polymeric substances for consolidation purposes when encountering problematic face or roof conditions is common. Polyurethane resin is one such substance, and the process involves the injection of resin consisting of two components into a predrilled hole, which enables the resin to flow into the fractured coal or strata. The mixing of the components causes the PUR to expand and harden but also causes an exothermic reaction, with the PUR heating to high temperatures when curing.

Now, PUR was injected into the longwall face on 26 March, again on 16 April and on 3 May 2020. The PUR used was a product supplied by a business known as DSI. It was called Strata Bond HA. According to the technical data sheet for that product, the maximum reaction temperature when the two products comprising HA, which are HA "A" and HA "B", are mixed at a 1:1 ratio by volume is less than 135 degrees Celsius.

Curiously, though, DSI's risk assessment for the same product described a maximum curing temperature of between 110 and 120 degrees Celsius. And even more curiously, that risk assessment included the words immediately after those temperatures "see Arnsberg permit".

Now, that was a reference to an approval by the Arnsberg Regional Authority located in North Rhine-Westphalia in Germany for the use of the product. That approval identified a maximum reaction temperature in testing, assuming a 30 degree ambient or starting temperature, of 146.53 degrees Celsius, which it was said may increase depending on volume.

DSI's product was also tested by the New South Wales Mine Safety Technology Centre test report, which reported a mean reaction temperature of 139.7 degrees Celsius.

Now, in mid-2019 Grosvenor decided to change the PUR

product from one supplied by a company called Minova to that supplied by DSI. The change was finally implemented in March 2020. The Minova technical data sheet specifies a maximum curing temperature of 122 degrees Celsius.

Grosvenor undertook a change management process which involved a comparison of the two products. Despite the differences in maximum curing temperature, the Anglo employee who undertook the analysis concluded that there was no significant difference between them.

Mr Watkinson hypothesises that the use of PUR in the May campaign, particularly in the quantities involved, may have resulted in a localised heating event of sufficient intensity to ignite an explosive mixture of gas in the goaf fringe. It is proposed to examine this hypothesis in the course of the hearings.

The sequence of events that led to the use of PUR commenced on the morning of 2 May. At 8am that day the longwall face was inspected by the mine geologist in response to a report about deteriorating conditions overnight. The longwall strata TARP was escalated to level 3 during the inspection, and the geologist mapped the change of the face at that point as being maingate 4002.9 metres, tailgate 4005 metres.

Later that day, at 12.53, an email to which I've partly referred before was sent by the SSE, Mr Griffiths, to the site leadership team saying:

Unfortunately we [are] losing control of the fault on the face from 93 roof support to 132 roof support.

The constant "stop-start" lack of momentum last 48 hours has really impacted us and now we are at the cross-roads.

At this point we are looking at injecting PUR into the face in this area to help create some stability before get moving again. We are aiming to have this injection work done by round 10am tomorrow.

We need to move on the increased goaf drainage "venting" process immediately.

For one reason or another (combination of the Directive on the 2.0% per cent [armoured face conveyor] and shearer trip and a BUCKET load of gas in a rather small goaf) we are losing the war and at risk of losing this longwall as the fault approaches the tailgate end of the face.

There was a meeting involving, amongst others, the mine geologist and other mine officials. The objective was to review the conditions and determine a plan moving forward. As a result, a face consolidation plan was authorised to drill and inject PUR from shields 97 to 132 using what were known as C holes. Those holes are at 2 metre spacings. The area therefore to be covered was about 70 metres. The C holes were 4.5 metres long with packers at 1.5 metres and there were two dowels to be inserted, but due to the angle of drilling those holes, the horizontal penetration into the face was 3.9 metres.

At 12 past 5 that day an email was sent to a large number of addressees from the geologist notifying that the longwall had been inspected and providing an update on the roof conditions and cavities and noting a recommendation to pump PUR as per the plan that I've just described.

So the PUR was pumped to fill the holes during the course of 3 May, and there was no production on either 2 May or 3 May, until the PUR was completed at about 10pm.

There is a PUR application report in existence. It confirms that on 3 May 2020 a total of 5,664 litres, or 6.3 tonnes, of PUR was injected along a 70 metre wide section of the longwall face in holes that were spaced at about 2 metre intervals.

Now, we have an electronic log of the shearer position, which shows the shearer position over the days leading up to the ignition and including the period when the PUR was injected, indeed slightly beforehand. It shows that from about midnight on 3 May until 10pm on 4 May, nine shears were completed. Each shear is approximately 1 metre deep.

The face was then idle for approximately 28 hours between 10pm on 4 May and 2am on the morning of 6 May. A further two shears were conducted on 6 May.

Now, the distance from the rear of the longwall shields to the face varies according to the conditions, but it's between 6.5 and 8 metres. This means that during the downtime commencing on 4 May, the coal in the roof above the shields that was injected with PUR would have been either directly above the shields or in a position to have caved into the goaf immediately behind the shields.

THE CHAIRPERSON: Mr Hunter, I think we might take a break at this stage before you carry on with that. We will adjourn for 15 minutes. Thank you.

SHORT ADJOURNMENT

THE CHAIRPERSON: Yes, thank you, Mr Hunter.

MR HUNTER: May it please the Board, I was in the process of explaining what would happen to the PUR that had been injected into the face as a result of the mining activity that then took place and I was explaining that the distance from the rear of the longwall shields to the face is between 6.5 and 8.5 metres.

That means that given there had been 10 shears or thereabouts conducted, during the downtime commencing on 4 May the coal in the roof above the shields that was injected with PUR would have either been directly above the shields or would have been in a position to cave into the goaf immediately behind them.

The period of inactivity would have prevented any PUR that had fallen behind the shields from being buried deep into the goaf by the caving process as the longwall retreated.

Now, the significance of the use of PUR with its exothermic qualities in the fashion employed at the mine was pointed out in technical expert reports given to Grosvenor mine in 2014 and again in 2019. The reports adverted to the risk of PUR heating coal to temperatures such as to substantially accelerate a further increase in temperature from the self-heating properties of the coal, potentially initiating a spontaneous combustion event.

In 2014, there were samples taken from boreholes at a depth of 187 metres, so not from longwall 104, but they

were assessed as having low intrinsic spontaneous combustion reactivity, but the author of the report, Dr Beamish, from whom it's likely the Board will hear, said - this is 2014:

> *There is one possible situation that could lead to a spontaneous combustion event that is not captured in figure 10 --*

figure 10 being the aspect of the report that dealt with the low intrinsic spontaneous combustion reactivity of the coal:

> *This is when the coal comes into contact with an external heat source, such as a curing compound (for example PUR). Under these circumstances the temperature of the coal may be artificially raised beyond the point where the natural inhibition from moisture and mineral matter in the coal is overcome and thermal runaway prevails. This can be seen from the results of a step-heat test ... applied to a sample from Grosvenor mine to obtain the relative ignition temperature value. Where this situation is likely to be present, vigilant gas monitoring should be adopted to identify the presence of any elevated temperature in the coal using indicator gas trends.*

Now, the same warning was repeated in another report by Dr Beamish in 2019, and this was a report to Anglo concerning the testing of samples of coal from longwall 103 for spontaneous combustion potential.

> In that report, Dr Beamish advised:
>
> *For the samples from 103MG 25CT at a mine ambient temperature of approximately 45 degrees C, incubation to thermal runaway is not possible in any practical time frame. However, if the coal comes into contact with an external heat source for a period of time, self-heating to thermal runaway is possible.*

The Board will see a graph where the test results showed how, after the effluxion of sufficient time, coal heated to 100 degrees Celsius would thermally run away.

Coal samples from the middle and lower portions of the Goonyella Middle seam responded in a particular way when subjected to what Dr Beamish referred to as step heating.

Dr Beamish's draft report referred to a 2009 paper by David Cliff, amongst others, where the authors summarised the factors that influenced the developing of a coal heating. One of those was said to be this: :

> *The amount and nature of coal left in the goaf: This relates to a critical pile thickness needed for the coal to insulate itself and prevent heat losses as well as the particle size distribution of the coal which will affect the rate at which the oxidisation reaction can take place. (Note again that a substance like PUR is also a very good insulator and when coal is encased in PUR it is effectively placed in an insulated oven and heated to 152 degrees C).*

There is nothing novel in the proposition that PUR poses a genuine risk of facilitating spontaneous combustion when injected into coal.

On 13 December 1986 a fire occurred at the longwall face at West Cliff mine situated near Appin, New South Wales, after PUR was pumped into a roof cavity. At Pike River mine on 30 November 2010, PUR used to seal the mine portal 11 days after the initial event caught fire, significantly disrupting the sealing process.

Whilst those events involved the self-ignition of PUR rather than coal, the potential of the product to generate heat in proximity to coal that is prone to spontaneously combust when heated raises obvious concerns.

Now, consistently with Dr Beamish's findings, the principal hazard management plan at Grosvenor for spontaneous combustion specifically recognised an exothermic reaction from PUR as a potential source of heat. Similarly, the explosions WRAC recognised the risk of

exothermic reaction from PUR providing an ignition source.

The risk assessment for explosions identified the chemical energy provided by an exothermic reaction as a potential source of ignition, and the control measures relevantly were identified as being the use of polymeric chemicals hazard management plan and standard work instructions, original equipment manufacturer standards including maximum allowable use limits, statutory inspection regimes, ChemAlert and standard operating procedures for hazardous substance approval processes.

The risk analysis for the use of polymeric chemicals for strata control and sealing that was issued on 17 February 2020 noted the exothermic reaction and asserted that, "to minimise the potential for fire, fire retardants are added, and restrictions have been placed on quantity of PUR to inject per hole. A number of controls was specified in relation to "self-generated fire of resin".

The risk analysis does not, however, address spontaneous combustion of coal resulting from the application of PUR. Similarly, the hazard management plan for the use of polymeric chemicals refers to the risk of fire in the resin itself but not to spontaneous combustion.

Andrew Self, from whom the Board will hear, is a mining engineer with a first class certificate of competency. He has 30 years' experience in the industry and since 1990 has been a consultant in Australia and elsewhere. His areas of expertise include ventilation, spontaneous combustion, gas management and explosions.

Mr Self prefers a localised spontaneous combustion as the more likely ignition source. Given the limited gas data for spontaneous combustion, the small size of the heating may be consistent with the involvement of PUR.

Mr Self's analysis, however, begins with consideration of the scale of the gas management problem at Grosvenor.

He reviewed Flugge modelling undertaken by Dr Roy Moreby in 2010 in which it was concluded that when mining the Goonyella Middle seam, the P seam was likely to account for 40 to 50 per cent of total gas emissions from coal sources.

His predictions of specific gas emissions for the mine at a depth of 370 metres required a drainage capacity of 2,336 litres per second at a post-drainage capture efficiency of 77 per cent. Post-drainage capture efficiency is the percentage of the total gas emission that is captured by the drainage system and prevented from entering the ventilation network. 2,336 litres per second and 77 per cent PDCE are each readily achievable. It has to be said, though, that that modelling proved to be optimistic.

In 2011 GeoGAS undertook predictive gas emission modelling, and that modelling involved data from a fairly limited number of boreholes drilled into or close to what were then proposed longwalls 2, 3 and 4, 7, 8 and 11.

GeoGAS recommended additional pre-drainage of the P seam - when I say "additional", I mean additional beyond what had been undertaken by Arrow Energy when about 20 or 25 per cent of the gas content of the P seam had been drained. GeoGAS recommended additional pre-drainage of the P seam and a gas drainage system with the capacity to handle 7,500 litres a second at 80 per cent post-drainage capture efficiency, again something that was relevantly achievable.

It was also recommended by GeoGAS that the rear-of-block ventilation be put on return, particularly during extraction of the inbye portion of each panel. As has already been noted, the shaft at the rear of longwall 104 was not on return but in fact had a downcast fan.

There was a further study done in 2020 by Palaris. In 2020 Palaris undertook a gas management assessment that considered data from longwalls 102 and 103 and had noted the following differences between the two panels. Now, the total methane generated for longwall 102 was between 5,000 and 7,000 litres per second, whereas for 103 it was 6,500 to 8,500.

The specific gas emissions for 102 were 19 cubic metres a tonne, whereas for 103 the figure was 25 cubic metres a tonne. The post-drainage capture efficiency for 102 was between 70 and 90 per cent, whereas for 103 it was between 80 and 95 per cent.

Palaris recommended a strategy that included pre-drainage of the P seam and a high-capacity goaf drainage system with a capacity of 17,500 litres per second, with a post-drainage capture efficiency of between 60 and 90 per cent.

Mr Self then undertook his own calculations and compared longwall 103 gas make with data from 104, and he noted that the 104 gas make was consistently 6 cubic metres a tonne higher. Furthermore, he noted that whilst longwall 104 did occasionally achieve a post-drainage capture efficiency above 90 per cent, the norm was a figure in the 80s.

Now, Mr Self, having undertaken these calculations, will say that based on production of 25,000 tonnes a day, the goaf drainage requirement was 10,000 litres per second at a post-drainage capture efficiency of around 93 per cent, the latter figure being at the upper limit of what is achievable and not realistic.

Furthermore, Mr Self makes the point that increasing gas drainage carries with it the risk of spontaneous combustion because the increased suction draws air into the goaf, and he will explain at some length the paradoxical relationship between the objective of extraction of methane from the goaf and the simultaneous elevation in the risk of spontaneous combustion.

Overall, Mr Self will say that, in his opinion, the methane gas emission regime at Grosvenor was extremely challenging.

Mr Self's analysis of the event that led to the explosion is that it was a sudden one, as exemplified by the near-instantaneous increase in methane levels at the sensor on the underside of the roof of shield 149 at the tailgate. In his view, the pressure events are best explained by a goaf fall and then an ignition as a result of a localised spontaneous combustion event. He regards the PUR theory as credible.

Dr Ray Williams will be called. He is a coal geologist and geotechnical engineer. He has worked as a consultant to the coal mining industry for several decades, relevantly in the areas of coal seam gas, gas reservoir definition, gas drainage, modelling of gas

emission and gas production.

He was the founder of GeoGAS in 1990, a gas consultancy and laboratory services company serving the underground coal mining and coal seam gas industry.

He has conducted an exhaustive analysis of data relating to Grosvenor mine, with a focus on longwalls 103 and 104, and has prepared reports concerning that analysis. His examination related to the subjects of assessing the effect of the gas reservoir on mining at Grosvenor, "gas reservoir" being a reference to the gas in all the strata both above and below the seam being mined that affect gas emissions at that seam, and also gas drainage strategy at Grosvenor, both pre- and post-drainage.

The presence of methane in an underground coal mine is not only a function of working the mine seam. Methane gas from seams above and below the working seam has the potential to emit to the working seam. This was recognised in the second workings SOP for longwall 104, which stated that:

> *Most of the gas that needs to be managed during second workings comes from coal seams above and below the working seam.*

According to Williams, the gas from those other seams migrates along bedding planes to the lateral fractures and then finds its way down into the workings along those lateral fractures.

The GM seam was being mined at a depth of 390 metres, and there are significant coal seams both above and below the GM seam. Above the GM seam are the P seam, the QA seam, the QB seam and the Fair Hill seam. Each has been assessed for its contribution by way of gas emissions to longwall 104 in particular.

As I said a moment ago, pre-drainage of the GM seam was undertaken by Arrow Energy over a number of years in advance of mining. This was successful but not uniform in result. Supplementary pre-drainage was undertaken in 2018 and 2019 to reduce gas content levels below the target of 2 cubic metres a tonne. His opinion is that the GM seam was effectively pre-drained.

When I was speaking a moment ago, I was referring, though, to the P seam, which the evidence will, it is suggested, show was not effectively pre-drained.

The Fair Hill seam is stratigraphically a long way above the 390 metre depth of longwall 104, and over the mined area of 104 the Fair Hill seam ranges from between 180 and 225 metres in depth. But Dr Williams has considered its likely contribution to gas emissions at 104.

A rule of thumb is that seams that are more than 150 metres distant from the working seam are unlikely to contribute gas to the working seam by virtue of sheer distance from it.

Third party advisers had given such advice to Grosvenor mine in relation to the Fair Hill seam, and they were Dr Moreby in 2010 and Palaris in 2020.

Dr Williams contends that the rule of thumb does not apply here because of the Fair Hill seam's particular features. He argues that the importance of a coal seam gas source is determined not only by proximity to the working seam but, in addition, the magnitude of its gas reservoir size and the gas saturation and desorption pressure of that seam.

The Fair Hill seam has a thickness of 45 metres and, as such, it constitutes a massive gas reservoir approximately three times the size of the virgin gas content of the GM seam.

The magnitude of gas desorption pressure is a driving force behind gas emission. Apart from its size, the Fair Hill seam exhibits high, near 100 per cent, gas saturation and high desorption pressure. These are concepts that Mr Williams will explain, but it is sufficient for the moment to say that the implication of such high saturation and desorption pressure is that the gas will desorb the instant that pressure is reduced, with the potential to find its way into the mine workings, albeit a considerable distance below.

Dr Williams supports his contention as to the potential significance of desorbing gas in the Fair Hill seam by reference to gas content testing from boreholes situated in previously mined longwalls 101 and 103. That

testing shows the Fair Hill seam did desorb about 19 per cent of its gas in the course of mining those longwalls.

If that degree of emission is applied to longwall 104, the Fair Hill seam would potentially represent 29 per cent of the total gas emitted from the seams above and below the Goonyella Middle seam.

The mine management recognised in its report on the so-called venting trial at longwall 103 in August 2019 that the Fair Hill seam had degassed in the course of mining. It put the figure higher than Dr Williams, at 25 per cent desorption. The report said it was unclear whether or not the Fair Hill seam contributed to goaf gas levels, but that there is gas coming into the goaf and the tailgate from somewhere; it is not known where.

The report recommended further analysis to identify methane sources into the longwall goaf. There is no reference in the risk assessment for goaf drainage for longwall 104 conducted in January 2020 to the undertaking of this further analysis.

The P seam lies some 50 to 60 metres above the Goonyella Middle seam. Specific gas emission studies undertaken by GeoGAS in 2008 and by Roy Moreby in 2010 recommended pre-drainage of the GM seam. Palaris recommended the same in 2020. It was recommended that it be done before production.

Partial pre-drainage of the P seam was conducted by surface to inseam boreholes drilled by Arrow Energy. Gas content tests for borehole DDG295 showed partial pre-drainage of the P seam achieved by the Arrow wells - that is, about 28 per cent of virgin gas content drained to 7.4 cubic metres a tonne from the virgin state, which was 10.4 cubic metres a tonne.

As noted in the Grosvenor mine December 2019 risk assessment for longwall 104, further pre-drainage of the P seam was attempted but was abandoned when 837 metres of drill stream became stuck in the seam.

Without that intended pre-drainage, Dr Williams estimates that the P seam could be expected to emit 27 per cent of the total gas emissions from the seams above

and below the GM seam. Initial predictions from Moreby put to the mine in 2010 had that figure rather higher, at 43 per cent.

So that risk assessment made it clear that the mine knew that as a result of the lack of pre-drainage in the P seam and the Goonyella Middle Lower seam, "there will be increased goaf emissions until longwall 104 meets the install roadway of longwall 103 as there will be gas desorbing from three sides instead of two".

The area identified as being susceptible to increased gas emissions covered the area up to and beyond the position of the longwall face at the time of the serious accident.

The documentation establishes that the mine was well aware that it was likely to experience elevated methane emissions during the production of longwall 104.

Predictions of gas emissions to the GM seam from seams above and below undertaken for Grosvenor mine by Professor Moreby took no account of gas emission from the Fair Hill seam. The mine itself questioned but appears not to have resolved whether the Fair Hill seam contributed and, if so, the extent of that contribution.

The P seam was always anticipated to be a major contributor of gas to the GM seam once mining commenced, hence the mine was advised to pre-drain it. This had only been partially done by Arrow and further pre-drainage was not undertaken. In addition, with the program of drilling lateral wells - and I will make some comments about this in due course - those lateral wells were not completed for the commencement of mining at longwall 104.

A specific objective of goaf gas management by Grosvenor mine for longwall 104 was to mitigate events of greater than 2.5 per cent methane in the tailgate. The post-drainage strategy for longwall 104 was influenced by the mine's experience with longwall 103 and, in particular, a test conducted at longwall 103 with the density of goaf hole spacing.

That then brings me to the venting trial that I've referred to. During July 2019 numerous methane HPIs were experienced on longwall 103. One response to that was to

conduct a trial between 2 and 16 August which involved virtually doubling the number of active goaf wells for post-drainage. The added goaf wells were of two types. There were six existing distal wells that were between 670 and 1030 metres back from the face. They were reconnected. And there were six wells near the face with progressive new connections.

Now, the exercise achieved success in reducing the tailgate methane emissions through an increase in goaf well gas flow.

For longwall 104, the gas management strategy described in the risk assessment for goaf drainage included the use of 25 metre spaced vertical goaf wells for the first 1000 metres of retreat.

The underground mine manager noted, as I've already said, on the risk assessment document that the increased risk of spontaneous combustion due to the increased gas drainage had not been assessed. The risk assessment for goaf drainage did, though, note a concern that with closely spaced goaf holes the gas purity may fall to levels that require the boreholes to be shut in.

Now, that concern appears to have materialised, because TARP triggers required that goaf wells be shut in at various points during the first 400 metres of retreat of longwall 104, and as at the date of the explosion, 10 of 20 available wells were operating.

For longwall 104, four mid-panel lateral wells were also designed to be drilled into the P seam to capture the gas released with the yielding or unloading of the strata below. The intended effect was to allow post-mining gas from the P seam to be captured by the wells, thereby avoiding its release to the longwall mining area.

However, drilling one of the wells ran substantially over time, causing the drilling of another to be abandoned because it was too close to the scheduled start-up of longwall 104. The P seam therefore went effectively undrained.

Mining commenced on longwall 104 on 9 March 2020 with gas drainage deficiencies concerning the P seam pre-drainage and with lateral wells that had not been

completed. This was in the face of recognition in the venting trial report in August 2019 that improved pre-drainage practices and goaf ventilation strategies "must be a priority of future work".

In those circumstances, Grosvenor mine was putting heavy reliance upon its post-drainage goaf holes.

Dr Williams also considered the efficacy of the technique of closely spacing goaf wells. His report includes a comparison of gas make and goaf well methane production figures as between longwalls 103 and 104. Over the first 390 metres of retreat for both longwalls, he notes a 65 per cent increase in gas make for longwall 104. He also identified more than double the volume of goaf well production at longwall 104, despite numerous of the wells of longwall 104 not being online at various times during the retreat for various reasons.

That led him to consider the potential reasons for such large differences in gas make and goaf well production. He postulates that the shut-in wells for longwall 104 may in fact have served as conduits to the goaf for gas from the seams above via cracks in the casing around the wells, as well as the migration of gas to the goaf along bedding planes. He raises the prospect that tailgate goaf wells are subject to considerable differential rock movement that is apt to fracture the cement along the outside of the well casing and create conduits for gas.

He concludes that the fractured cement casing, in conjunction with the higher density of wells, the turning wells off and the high saturation and desorption pressure of seams above the Goonyella Middle seam resulted in significant additional gas reporting to the tailgate corner.

That then brings me to the HPIs and, firstly, the longwall 103 HPIs. There were 13 of them between 2 July and 7 November 2019. It is not proposed to recite the detail of them now. They are well described in Anglo's own internal learning from incidents reports.

The incidents were attributed to a variety of causes, including the position or speed of the shearer, floor blowers, ventilation change being improperly executed,

drops in barometric pressure, goaf falls and a fall of rock onto the face obstructing longwall ventilation.

What emerges, though, from Anglo's own documents is repeated recognition of the failure of the gas drainage system to cope with the amount of methane generated by mining operations. The LFI reports repeatedly describe the gas drainage system as having failed on the basis that "design capacity cannot sustain current production rate". A much-repeated solution to the problem was said to be the development of a plan to increase goaf drainage capacity for peak specific gas emission areas of Grosvenor, to reduce tailgate methane concentrations to meet business plan productivity targets, which raises a concern about whether production was being prioritised over safety.

The first two incidents prompted the formulation of the Grosvenor gas plan, which was the subject of an email the morning of 11 July 2019. It suggested, perhaps unremarkably, that the mine establish where the elevated specific gas emissions were coming from, including a proposal to drill and measure the P and Fair Hill seams and also to drill lateral drainage holes in the P seam for longwall 104, which of course didn't occur.

Now, after a further HPI on 15 July there was a meeting amongst senior staff at Grosvenor with the stated objective to develop and implement strategies to assist in reducing the methane emissions in the tailgate roadway and the longwall face to adequate levels to allow consistent longwall production in line with forecast. Solutions proposed included a ventilation change and drainage from the P seam. The ventilation change went ahead as proposed. However, it resulted in an HPI. It was done on a barometric low when a fatigued ventilation officer opened a regulator incorrectly. There had, however, been precautions taken and workers had been withdrawn from the tailgate and the perimeter road.

As has been noted in connection with Grasstree and Moranbah North, it is common for senior staff involved in an HPI to fill out an incident report form. That incident report form included a question that was posed: has the defect or incident been effectively controlled on shift?

After two HPIs occurred within the space of 90 minutes on 24 July 2019, the person completing the form answered

that question "no" and wrote "incidents keep occurring". Again, the cause or one of the causes of those two incidents was said to be "design capacity cannot sustain current production rate".

The investigation found that the ventilation and gas management system was unable to accommodate sudden spikes in general body concentration and was designed for specific gas emissions lower than current conditions.

The proposed solution was again to develop a plan to increase goaf drainage capacity for peak SGE areas of Grosvenor, to reduce tailgate methane concentrations to meet business plan productivity targets.

And the same or similar conclusions were drawn after further HPIs on 17 August and 19 October.

For the last of the longwall 103 incidents, which involved the release of 1500 cubic metres of methane from the GML seam reporting to the longwall from two floor blowers, the conclusion was that gas pre-drainage had failed and that the proposed solution was to trial pre-drainage of the lower seam, but in longwall 105.

Moving to longwall 104, it is perhaps unsurprising in light of what has been said already that the mine experienced elevated methane levels along longwall 104. Mr Self has expressed the view that the onerous methane gas emission regime was extremely challenging for Grosvenor and most likely contributed to the frequency of methane gas exceedances. This view appears to be borne out in the mine's own records.

The mine experienced 14 methane exceedance HPIs between the start of production on 9 March 2020 and the date of the serious accident on 6 May.

The first HPI occurred on 19 March, 10 days after production commenced. The next HPI occurred the following day. Thereafter, the mine experienced a further five methane exceedances in five days. There were three on 20 March and single exceedances on each of 22 and 23 March.

In documentation sent by the mine to the department, the mine suggested those exceedances were largely due to blockages of one of the goaf drainage holes. However, as

the form 5As that the mine would later produce to the inspectorate in relation to the 7 March exceedances identify, the cause of the exceedances was said to be the lack of P seam drainage.

In each form 5A, the associated preventative action was to complete P seam drainage for future longwalls.

There were plans for longwall 104, but they were confined to investigating alarm failures, preventing blockages in goaf skid flame arrestors, assessing the ventilation network and amending the gas drainage TARP for high-flow goaf maintenance practices, but none of them was apt to address the fundamental problem of gas levels with which the mine was struggling to cope.

Less than two weeks after the exceedance on 23 March, the mine had an HPI on 4 April, and again on 6 and 7 April.

A number of those exceedances were picked up on the 149 sensor in the last shield. The form 5As for those exceedances variously identified the causes of the exceedances to be greater than expected gas make in excess of the system capacity; less than adequate methane pre-drainage/recovery/dilution; and less than adequate ventilation control devices.

On 17 April the UMM, Mr Niehaus, wrote to the department asking to be exempt from the requirement in section 243A of the regulation that power to the shearer and AFC be tripped when methane reaches 2 per cent.

The mine knew that it was about to cut through a fault and was expecting that fall material might cause ventilation blockages along the face, and the mine wanted to be able to operate the shearer and armoured face conveyor to clear such material, even when methane exceeded 2 per cent on the section 243A sensor.

That request was denied by the regulator. Four days later, on 21 April, the mine had another four methane exceedance HPIs, the last of them involving a reading which exceeded 5 per cent.

As with the earlier methane exceedances, the form 5As, which were completed after the date of the serious accident, for these exceedances identified that the causes

of them were greater than expected gas make in excess of the system capacity and inadequate ventilation control measures around the tailgate drive area.

There were no further HPIs in the two weeks between then and the serious accident. However, the LFI report for the methane exceedances on 21 April identified that there were four further events between 21 and 23 April where methane was detected to be above 2.5 per cent, but the events were not reported as HPIs to the department. It is not clear from the LFI reports why those incidents were not classed as HPIs.

The position with respect to gas management difficulties being experienced would appear to have been encapsulated in the email that I referred to earlier from the SSE, Mr Griffiths, to senior employees at Grosvenor on 1 May. That email, whilst relevant to the serious accident, is also relevant to the HPIs. He said:

> *Unfortunately despite a rather small longwall 104 goaf (and goaf gas reservoir) the methane levels in the tailgate are almost to the point of bordering on being unmanageable - causing huge issues (with new Directive enforced of 2.0% trip armoured face conveyor and shearer) with constant delays which is starting to concern me.*

That concludes what I have to say by way of opening remarks.

THE CHAIRPERSON: Yes, thank you.

MR HUNTER: If it is now convenient, I will proceed to call the first witness, who is Stephen Donald Smith.

THE CHAIRPERSON: Yes.

<STEPHEN DONALD SMITH, affirmed:

EXAMINATION BY MR HUNTER:

MR HUNTER: Q. Mr Smith, welcome back. Would you tell us your full name, please?
A. Stephen Donald Smith.

Q. You are an inspector with what's now Resources Safety & Health Queensland?
A. That's correct.

Q. Tell us the formal title of your position?
A. My formal position is Regional Inspector of Mines, coal mines, north region.

Q. The north region is centred around Mackay?
A. Centred around Mackay, essentially mines north of the road between Middlemount and Capella.

Q. You have sworn a statutory declaration in relation to the evidence you are to give in these proceedings today?
A. Yes, I have.

Q. And I take it you've looked at that recently?
A. Yes, I have.

Q. And are there any changes or alterations you'd like to make to it?
A. Not at this time, no.

Q. I'm not going to take you through it in detail, but I'd like to ask you some general matters in fact about the Grosvenor mine prior to July 2019. How long have you been the regional inspector at Mackay?
A. I commenced in that role in August 2019.

Q. Have you reviewed the mine record entries going back to the commencement of production, the commencement of development, at Grosvenor mine?
A. I have read many of the MREs that are referenced in my statement, if not all of them, but I haven't been through all of those in the recent past.

Q. Perhaps I'll just try it this way, and if you need to see the actual document, we can have it shown to you. I'm going to ask you about a mine record entry from 15 December 2016, when inspector Dobson issued a directive to the mine, that directive being to ensure compliance with the control and management of methane in the longwall tailgate. Do you recall that?
A. No, I don't.

Q. Mr Operator, could I trouble you please for document

RSH.002.255.0001. Do you see in the top right-hand corner the date of 15 December 2016?
A. I do.

Q. Do you see it's an MRE concerning Grosvenor coal mine?
A. I do.

Q. If you look at the first paragraph, it says:

Inspector Keith Brennan and I attended Grosvenor Mine today ...

A. Am I able to adjust this?

Q. Sorry. Do you see that there?
A. I do now, yes.

Q. If we go to the last page, please, page 8, do you see the two persons referred to are Shaun Dobson and Keith Brennan?
A. I do.

Q. And go back to the front page, please, and just scroll down a touch. Do you see there at about point 25 on the page "Directive"?
A. "Directive: To ensure compliance"?

Q.

To ensure compliance with the control and management of methane in the Longwall Tailgate.

A. I do, yes.

Q. So that's December 2016. Is it your understanding that that direction was given against a background of high potential incidents involving events of that nature that went back as far as February 2016?
A. I'm afraid I'd have to --

Q. You don't know.
A. I don't know, yes.

Q. Let's see if you accept this proposition: notwithstanding the giving of that direction, there were multiple HPIs of a similar sort in the months, indeed years, that followed?

A. I would accept that, yes.

Q. There were, can I suggest, 27 methane HPIs on longwall 102?
A. The total number, I'm afraid I can't affirm or deny.

Q. Let's have a look at the mine record entry for 9 May 2018, which is RSH.002.273.0001. Do you recall seeing that?
A. I have seen that MRE, yes.

Q. If we go to page 3, do you see at paragraph 5 there was an acknowledgment that continued HPIs with methane greater than 2.5 per cent was not satisfactory and the mine must ensure that such HPIs are minimised and preferably eliminated going forward?
A. Yes, I do.

Q. If we go back to the first page, please, and scroll down so we can see the text at the foot of the page, please, do you see there it is said:

> *We explained that the mine had reported 32 HPIs since LW 102 had commenced production in January 2018.*

And this is May 2018.

> *This represented 60% of all HPIs in Queensland associated with Methane greater than 2.5% in the Longwall tailgate.*

A. Yes.

Q. Do you recall seeing that?
A. I do.

Q. Had you seen that prior to the preparation of your statutory declaration, though?
A. I would have, yes.

Q. Sorry?
A. Yes.

Q. Thank you. I assume you accept this proposition, that despite what is contained in that document, methane HPIs involving the longwall tailgate continued to occur?

A. They did.

Q. So I'm now going to ask you about the longwall 103 HPIs. Could the witness be shown AAMC.001.009.0255, please. We can see at the top of the page that it's a form 1A?
A. That's right.

Q. Concerning an incident that occurred on 2 July 2019?
A. That's correct.

Q. If we scroll down the page, please, we can see the description of it. It describes an event involving a methane exceedance at the tailgate?
A. Yes.

Q. Could we go then, please, to AAMC.001.009.0336. This is an email from Elysse Maunder. This is the form 5A; correct?
A. It appears to be the method of - it's got an incident report number there of 142508, which would - and its format is in the form 5A style, yes.

Q. So it relates to the same incident?
A. An incident on 2 July, yes, it does.

Q. If we go over the page, we can see the incident details.
A. Yes.

Q. Date of incident, 2 July.
A. Yes.

Q. If we then go over to the next page, we see the preventative action - yes?
A. Yes.

Q.

Develop a plan to increase goaf drainage capacity for peak SGE --

which means specific gas emission --

areas of Grosvenor to reduce tailgate methane concentrations to meet business plan productivity targets.

A. Yes.

Q. As well as:

Review shearer stop position in tailgate ... to reduce the effect of the shearer flushing gas into the mine ... when stopped during periods of low barometer. Complete ventilation change ...

A. Yes.

Q. This wasn't notified to you. You weren't with the inspectorate at this point, were you?
A. I was with the inspectorate at this point.

Q. Oh, you were.
A. Yes. At that time, my base was Rockhampton, though.

Q. Could I ask you about the preventative action. Do you agree with this proposition, that what's being proposed is not an immediate solution to the problem - the development of a plan?
A. In this particular instance, I think the immediate solution is the bottom line.

Q. I beg your pardon?
A. The more immediate - the solution that leads to a more rapid improvement is the last sentence, which is:

Complete ventilation change ...

Q. The development of a plan is necessarily not physically doing anything; it's planning to do something?
A. It's planning to do something.

Q. At some later point in time?
A. That's right.

Q. Does it concern you that what is proposed is to reduce tailgate methane concentrations so as to meet productivity targets? Do you understand what I mean by that?
A. In what way do you mean "concern"?

Q. Well, does it concern you that the plan would appear to prioritise the attainment of productivity targets as opposed to the attainment of a safety outcome?

A. If the plan reduces the methane concentrations to the requisite levels, then it achieves the safety outcome, which would be my - which is my main interest. If they get a production benefit as a result, well, so be it.

Q. Would you not have expected to see something that was more along these lines, which is: adjust productivity targets to coincide with the ability of the goaf drainage system to safely drain methane from the mine?
A. Yes.

Q. Because that sort of a plan would be prioritising safety ahead of production, wouldn't it?
A. Yes.

Q. Can we go, then, to the second HPI. Could the witness please be shown AAMC.001.009.0257. Could you zoom in on the top of that, please. We see that's a form 1A dated 3 July 2019.
A. Yes.

Q. It wasn't reported to you. It was reported to Mr Brennan and Mr Woods?
A. Yes.

Q. If we go down to the bottom half of the page, we see that it involves a methane exceedance in the longwall tailgate?
A. That's correct.

Q. Then go, please, to AAMC.001.009.0340.
A. I have that, yes.

Q. I'm just waiting for it to be brought up on the screen. Do you recognise that as being the completed form 5A being forwarded to the department on 31 July 2019?
A. Yes, I do.

Q. If you go over the page, though, you can see that the incident details are the same incident?
A. Yes.

Q. We see the preventative action proposed is again the development of the same plan that's referred to in the --
A. The previous one?

Q. -- form 5A for the previous one?

A. Yes.

Q. Could we please go to AAMC.001.009.0259. Do you recognise that as being the form 1A in connection with an HPI at Grosvenor?
A. Yes, I do.

Q. On 11 July?
A. That's correct.

Q. It was reported to Keith Brennan?
A. It was.

Q. Again, it relates to a methane exceedance in the tailgate?
A. That's correct.

Q. Could we please go to AAMC.001.009.0344. This is the form 5A, I suggest, in relation to that incident?
A. Yes.

Q. If we go over the page, we can see that it relates to the same incident that occurred at 1.37 on 11 July?
A. Yes, it does.

Q. And the preventative action related to identifying "areas of high-risk floor gas release and implement action plan for floor gas drainage"?
A. I do, yes.

Q. Go, please, to AAMC.001.009.0273 and zoom in on the top half, please. This is a form 1A reporting an HPI at Grosvenor on 23 July?
A. Yes, it is.

Q. If we could go to the bottom half, we see a description of the incident. Again, this resulted in a methane exceedance in the tailgate?
A. Yes, it did.

Q. Could we go, then, to the form 5A. That's AAMC.001.009.0372. If we go over the page, I'm going to suggest to you that it's a form 5A that relates to the same incident that occurred on 23 July at 15:44?
A. It does.

Q. The preventative action proposed is in the same terms

as the one we've already seen twice, which was to develop a plan to increase goaf drainage capacity?
A. That's correct.

THE CHAIRPERSON: Mr Hunter, are you meaning to show that on the screen as well, the preventative action?

MR HUNTER: I'm sorry, I should have done that, yes.

Q. Could we go to the third page, please. Do you see it there under "Preventative action"?
A. Yes. Yes, it is.

Q. I should have asked you this: I notice that you haven't been the person to whom any of these HPIs were reported. Do you recall seeing any of these form 5As thus far, at the time?
A. No, I don't. Not at the time, no.

Q. Am I right in thinking that at the time, there was no functionality in the departmental database on Lotus Notes that would pick up repeated occurrences of the same type?
A. That's correct.

Q. And flag them?
A. That's correct.

Q. Has that been changed now?
A. That has.

Q. Can we go, then, to AAMC.001.009.0263. Is that what appears to be a form 1A concerning an HPI that occurred on 15 July 2019?
A. It's reported on the 15th, yes.

Q. But the incident had occurred - was it the day before?
A. Yes.

Q. Yes, it had occurred the day before, I'm sorry.
A. No, that's okay.

Q. But again if we go to the bottom half, it involved a methane exceedance in the tailgate?
A. That's correct.

Q. That was reported to Inspector Callinan?
A. That's correct.

Q. Could we please then see AAMC.001.009.0352. This is, I'm suggesting, a form 5A in connection with the incident. If we could go to page 2, we can see it concerns an incident that occurred on 14 July 2019 at 11.25?
A. That's correct.

Q. Then can we go to the third page to see the preventative action, which was to develop a plan to increase goaf drainage, et cetera?
A. Yes.

Q. Do you recall seeing that at the time?
A. Not at the time, no.

Q. Can we then please go to AAMC.001.009.0269. It's a form 1A dated 22 July 2019, but it relates to an incident that occurred the previous day, the 21st?
A. That's correct.

Q. If you scroll to the bottom half of the page, please, the description is there, and again it involved a methane exceedance in the tailgate?
A. It does.

Q. And it was reported to Inspector Bulger.
A. Yes.

Q. I should have clarified that. Thank you. Could we go, please, to AAMC.001.009.0356. If we go over the page, I'm suggesting that's a form 5A in relation to the incident?
A. That's correct.

Q. If we go to the preventative action on page 3, we see that same formula of words again?
A. Yes, we do.

Q. Could we then go to AAMC.001.009.0769. This was a form 1A dated 22 July, indicating that the report was made initially to Keith Brennan?
A. That's correct.

Q. If we scroll down the page, we see that it relates to an incident that occurred that same day, and again it involved a tailgate methane exceedance?
A. That's right.

Q. Could we then have AAMC.001.009.0360. Could we go to page 2. We can see that it relates to that incident?
A. Yes, it does.

Q. And the preventive action specified on page 3 is yet again to develop a plan to increase goaf drainage capacity?
A. That's right.

Q. The next incident is described in the form 1A that is AAMC.001.009.0275. This is a form 1A dated 24 July 2019 concerning an HPI that was initially reported to Inspector Nugent?
A. Yes.

Q. If we scroll down, it again involves a tailgate methane exceedance?
A. Yes, it does.

Q. Could we please go to AAMC.001.009.0364. This is the form 5A, I'm suggesting. If we could go to page 2, do you see that there? If you look on the screen?
A. I've got the right document. The numbers are just slightly different at the top, but the words are the same.

Q. If you look on the screen at the document that I've called up?
A. Yes.

Q. That's the 5A?
A. That is, yes.

Q. And if we go to page 3, please, for the preventative action, again the same formula?
A. Yes.

Q. Can we go to the next form 1A, which is AAMC.001.009.0277. This one was again dated 24 July. It concerns an incident that was initially reported to Inspector Nugent?
A. Yes.

Q. Scroll down, please. The description again involves a methane exceedance in the tailgate?
A. It does.

Q. The form 5A is AAMC.001.009.0368. If we go to page 2,

please, we can see that this relates to that incident? Perhaps if you look at the screen.
A. Yes, approximately 13:50, yes.

Q. Yes?
A. Yes.

Q. If we go to the preventative action, you see that the preventative action proposed is to develop a plan to increase goaf drainage capacity, but also:

> *Pitch alarms set to Citect, add the requirement for acknowledgment and time stamp when accepted.*

A. Yes.

Q. Do you know what that means, "Pitch alarms set to Citect"?
A. Not strictly, no.

Q. Thank you. Could I take you to AAMC.001.009.0266. This is a form 1A dated 16 July 2019 concerning a report initially made to Keith Brennan?
A. Yes.

Q. If we scroll down the page, we can see that the description of the event concerns the making of a ventilation change?
A. Yes, it does.

Q. And the exceedance occurred at both the inbye and outbye tailgate sensors?
A. Yes.

Q. The form 5A I'm suggesting is AAMC.001.009.0348. Could we go to page 2, please. Do you see that there?
A. I do.

Q. If we go over to the preventative action, what's suggested is to review and update a procedure to include consideration to barometric pressure changes, but also to develop a plan to increase goaf drainage capacity and so forth.
A. Yes.

Q. All right, we're up to number 11 now. Can I ask you

to look at AAMC.001.009.0279. In the top half, this is a form 1A dated 17 August 2019 concerning a report that was initially made to Inspector Crisp?
A. Yes.

Q. The detail of the incident, at the bottom of the page, shows that it was a tailgate methane exceedance that occurred that same day?
A. Yes, it does.

Q. Could we have a look at AAMC.001.009.0376. If we go over the page, we can see that it relates to the same incident; do you agree?
A. Yes, it does.

Q. We see at the preventative action the identification of areas of high-risk roof collapse and "implement action plan install additional goaf drainage capacity", and it is said that this action already exists in the system:

> *Purchase additional Gas Monitoring Skids ... Purchase blower skids to >5000L capacity with flaring Additional reticulation lines if required by modelling to accommodate additional gas drainage capacity.*

That's along the same lines of what had been previously said in fairly broad terms; do you agree?
A. Yes.

Q. This is something specific?
A. More detailed.

Q. More detailed?
A. Yes.

Q. Again, do you recall seeing this or any of the ones that we've just seen at the time?
A. At the time, no.

Q. Discussing it with any of your colleagues?
A. No, I don't.

Q. Let's go to number 12. It's AAMC.001.009.0281. It's a form 1A dated 19 October 2019 showing an HPI that was initially reported to Inspector Callinan?

A. That's right.

Q. If we go down the page, we can see that it involves a tailgate methane exceedance?
A. That's right.

Q. Go over, please, to AAMC.001.009.0380. Go to page 2, please. Do you see that that's the form 5A concerning the incident?
A. Yes, I can

Q. And over the page, the preventative action is:

Implement a reduction of the ceiling setting from 1.9 to 1.6, until review of barometric pressure influence on T/G gas make.

Right?
A. Yes, that's right.

Q. You understood that to be, what, the change in a trigger level that would adjust the speed of the shearer?
A. That's how I understand it, yes.

Q. The level being - the 1.9 to 1.6 referring to percentages of methane?
A. Yes, that's how I understand it.

Q. So again a concrete proposal to do something specific?
A. Yes.

Q. I should say, it went on to say:

Review relationship between the rate of change during the main to tail cut run and develop a dynamic set point for 115 ...

The main to tail run is the passage of the shearer from the maingate to the tailgate?
A. That's right.

Q. And "a dynamic set point for 115 stop" - is that a reference to shield 115, a point at which the shearer would, according to whatever logic is programmed into it, stop?
A. I would interpret it exactly that way, yes.

THE CHAIRPERSON: Chock 115.

MR HUNTER: Q. Could we go to AAMC.001.009.0283. This is, I'm suggesting, the last of the HPIs on longwall 103?
A. That's right.

Q. The form 1A is dated 7 November 2019 and concerns a report that was initially made to Inspector Nugent?
A. That's right.

Q. Can we scroll down, please, to the description of the incident, again it involves a tailgate methane exceedance?
A. It does.

Q. Could we please then go to AAMC.001.009.0384. Over the page, we can see that it relates to the same incident?
A. It does.

Q. And the proposed solution is:

Trial of GML holes --

"GML" referring to the Goonyella Middle Lower seam?
A. That's right.

Q. So the seam immediately below the seam that was being mined?
A. Yes.

Q.

-- under way in LW105 to target immediate Gas Reservoir in floor horizon. Conduct a detailed investigation to try and identify the source of the methane.

A. Yes.

Q. Now, did you see that when it came in?
A. I don't recall specifically seeing that when it came in, no.

Q. Can I just come back to the phrase that was repeated on a number of occasions, that is, the plan to develop goaf drainage - I won't repeat the whole phrase, but having gone back and reviewed all of those, does the repeated use of that phrase - that is, the development of a plan - cause you any concern?

A. Immediately following the first two HPIs that you went through in July and Inspector Brennan's inspection at the mine and discussions with the people at the mine, the mine, after the second exceedance, ceased production voluntarily for 36 hours and they formed an incident management team. The minutes of the meeting that were composed by that incident management team were forwarded to the inspectorate and I think directly to Inspector Brennan. Now, I've seen those and been through those, and that contains the basic elements of a plan to improve both ventilation and gas drainage at the mine for longwall 103, and it references ahead into longwall 104 as well. So with that knowledge, it doesn't surprise me to see the repetition in the form 5As.

Q. Notwithstanding the development of this plan, the HPIs continued to occur, though?
A. They did. They did. The initial suggestion of Inspector Brennan, which was for the mine to reverse the ventilation that was currently coming past longwalls 101, 102 and around the back of 103 into the face was bringing half a per cent of methane with it, and his suggestion and advice to the mine was that if they had a look at their ventilation management, they may be able to reduce that significantly by sending the ventilation the other way so that what was coming on to the longwall face was intake air at zero or 0.1 per cent methane. He made the point, if I recall correctly, that had that actually been the case, several of these exceedances would not have been exceedances.

Q. The ventilation change was implemented.
A. It was.

Q. And it didn't stop a recurrence of the HPIs, did it?
A. It didn't - they did not cease. The nature of the HPIs following the ventilations changed compared to the ones pre the ventilation change.

Q. Go on, explain what you mean by that?
A. In terms of - the actual cause of the HPIs changed from being the shearer movement on the face, the shearer approaching the tailgate and the influence of the shearer on the ventilation across the face and consequently on what is drawn from the goaf. They were the first - they were the basic elements of the HPIs in early July. Subsequent to that, the ones in late July in general related to strata

control issues that appeared on the face and in the tailgate for the mine to deal with.

Q. They were no less concerning, can I suggest, because they related to strata control?
A. No less concerning, no. But in terms of the nature of the cause of the specific HPIs, the nature had changed, and in those circumstances, bringing the decreased methane on to the face, it does not surprise me that it didn't have the effect of preventing those particular HPIs.

It's the further development of their plan, which as we went through on some of the later HPIs with the purchase of additional gas drainage devices and I think there was an email in which the UMM indicated that their maximum capacity of gas drainage was 10,000 litres a second, and the intent was to get to 13,000 or 15,000 litres a second, so they were the actions that would have the effect on what gets taken out of the tailgate, or what's available to be taken out of the tailgate, when those other versions of - when the strata control-style issues arise on the face.

Q. Ms O'Gorman will ask you some questions after lunch about longwall 104, but the position is that the changes to goaf drainage didn't stop the HPIs, either, did they?
A. They didn't cease completely, but - absolutely not, but --

Q. They had another 14 in a couple of weeks?
A. In terms of longwall 103, they had had, if I recall correctly, seven gas exceedances in June, they had that series of nine in July, and then there was another three - one in August, one in October and one in November. So there was a significant reduction in the generation of HPIs in those last four months.

Q. So are you suggesting that a reduction to an HPI rate of one a month was acceptable?
A. I'm suggesting it's much better than eight or nine.

Q. But you're not suggesting it was acceptable, surely?
A. It's not wanted, and it would be in the mine's interest to do whatever they could to eliminate them.

Q. Particularly if the mine had been given a directive by an inspector that they were to ensure compliance with the control and management of methane in the longwall tailgate?

A. Yes.

Q. Just one last question before I propose an adjournment. What are the consequences of failing to comply with a directive? What can they be?
A. The consequences of failing to comply with a directive can be prosecution under the provisions of the legislation.

MR HUNTER: That's all I have for the moment. Is that a convenient time?

THE CHAIRPERSON: Yes. Ladies and gentlemen, we will adjourn until 2.30 today. Usually I hope that we will be able to resume at 2.15, but today it will be 2.30. Yes, thank you.

LUNCHEON ADJOURNMENT

THE CHAIRPERSON: Yes, Mr Hunter.

MR HUNTER: May it please the Board, I have concluded my examination of this witness. Ms O'Gorman will take over.

THE CHAIRPERSON: Yes, thank you.

<EXAMINATION BY MS O'GORMAN:

MS O'GORMAN: Q. Mr Smith, I want to begin briefly by reviewing some of the functions held by the inspectorate under the Act. I'm talking about part 9 of the Act, which, as you would know, sets out some of the functions and the powers that must be statutorily discharged by inspectors and regional inspectors of mines. You're aware of what I'm talking about?
A. Yes, yes.

Q. In particular, section 128 of the Act, I would suggest to you, is the section which sets out the functions of inspectors.
A. Yes.

Q. And there's a number of them, of course.
A. There is.

Q. The first one being to enforce the Act?
A. Yes.

Q. There are two further ones that are particularly relevant for our purposes, of course. One of those functions, set out in paragraph (c), is the function to inspect and audit coal mines to assess whether risk to persons is at an acceptable level?
A. Yes.

Q. And in respect of paragraph (g), there is a statutory function couched in these terms:

> *If unsafe practices or conditions at coal mines are detected, to ensure timely corrective or remedial action is being taken and, if not, require it to be taken.*

A. Yes.

Q. You know, of course, that sections 166 and 167 of the Act give you and other inspectors the power to give directives where required?
A. Yes.

Q. And we know that you're well aware of that because in the course of longwall 104, as we will come to, you did in fact issue a directive to Grosvenor mine on 9 April 2020?
A. I did.

Q. Now, just in terms of your background, and very briefly, you've had some 40 years by now in the coal mining industry, I take it?
A. Of that order, yes.

Q. All right, let's deal with it this way. You obtained your mining engineering degree in 1981?
A. That's correct.

Q. And since that time, you've occupied positions as undermanager of at least a couple of different mines?
A. I have.

Q. In addition to that - that is, working within the industry, but outside of the mines itself - you've worked as an inspector of mines in one capacity or another since about 2013?
A. That's correct.

Q. I think you told Mr Hunter before lunch that you

assumed the role of regional inspector of coal mines in about August 2019?
A. That's right.

Q. There was a period of time very shortly after you assumed that role, though, where you took on the role of deputy - no, I'm sorry, I've lost the precise name.
A. Acting --

Q. Acting deputy chief inspector?
A. That's correct.

Q. And you were in that role through until about November 2019?
A. I was.

Q. And then returned to your substantive role --
A. I did.

Q. -- at the end of 2019?
A. That's right.

Q. So by the beginning of 2020, by the time longwall 104 commenced production, you were back in your substantive role. You were the regional inspector of coal mines, northern office?
A. I was.

Q. In your office, you had some 10 inspectors or so who reported to you?
A. Of that order.

Q. They were expert, if I can put it that way, in a range of different disciplines, including mining, mechanical, electrical - things of that kind?
A. They were - they are.

Q. So between those inspectors, those members of your office, and your own personal background, you were by the beginning of 2020 well placed, both personally and as an office, to perform the statutory functions put on you by the Act?
A. We were, although we were busy --

Q. I'm sure you were.
A. -- with some significant investigations at that time as well, which consumed people almost full time away from

the functions of inspecting and auditing mines.

Q. I understand, and I think there was some evidence at the last tranche of hearings that, as a result of a number of fatalities that had occurred in the industry, you had certain inspectors deployed to those investigations?
A. That's correct.

Q. And that took up a lot of your people power?
A. That does, yes.

Q. What I was really getting at, though, was despite the busy nature of your office, based on what you've just told us about yourself as the regional inspector and your particularly long background in mining, you had the necessary training and experience in order to be able to fulfil your statutory requirements?
A. I believe so, yes.

Q. That is, you were well placed to inspect and audit coal mines, to assess whether risk to persons was at an acceptable level?
A. That's correct.

Q. You were also well placed to be able to identify unsafe practices or conditions and to ensure timely corrective or remedial action was being taken?
A. Yes.

Q. When you were answering questions of Mr Hunter before lunch, you indicated, as I understood it at least, that you personally didn't receive many, if any, of the form 5As that were provided to the inspectorate by Grosvenor in the course of longwall 103. Did I understand that correctly?
A. You did.

Q. I'm going to spend some time this afternoon with you now going through the form 1As and form 5As that Grosvenor produced to the inspectorate in respect of longwall 104.
A. Yes.

Q. Just before I begin, in order to give us an understanding of your personal involvement in those, I can see from your statement that you personally received a relatively small number of the verbal notifications of the HPIs on longwall 104?
A. I did. I received three.

Q. You received three of those, and in your position as regional inspector of coal mines you were able to, and, as I understand it from your statement, in fact did, receive the form 1As that were provided by Grosvenor for each of the HPIs on 104?
A. I received the form 1As for each - I received the form 1As directly for the exceedances that were reported to me or notified to me. The other notifications come by way of email from the inspectors that receive the notification, when they enter it into Lotus and complete the entry, part of the entry process is to distribute the notification to a distribution list of inspectors, which includes me, and that's how I would have seen them - not as the form 1A document that we looked at earlier on, but as a Lotus document, which is a slightly different format.

Q. Slightly different format, but it contained essentially the same content?
A. All the same information.

Q. As a matter of course, you, in your particular role, did in fact look at each of the form 1As as they came in during the course of longwall 104?
A. Perhaps not immediately when they came in but at some stage, yes.

Q. I take it that, given your involvement - the inspectorate's involvement, I mean - in respect of HPIs that had been occurring on 103, it would have been an issue that you were certainly alive to by the time of 104?
A. Yes, yes.

Q. And, accordingly, whether you looked at them the day they were uploaded into Lotus Notes or within a couple of days, you would nonetheless have read those documents at some time close to when they were uploaded?
A. Yes.

Q. What about the form 5As, does the same situation apply in respect of those - that is, whether or not you read them the day they were uploaded, you would have nonetheless read those documents shortly after they were uploaded?
A. Not necessarily at all, no. There's no - there has been no automatic notification that the form 1A [sic] has been received. That is distributed in the same way that the initial notification is distributed. To actually go

and look at the form 5As, one would have to enter, go into the incident itself in the database and then go through and find the form 5A.

Q. Perhaps as we go through each of the HPIs and documents provided by Grosvenor, I'll ask you as we come to them whether you recall seeing those particular form 5As?
A. At the time?

Q. All right, thanks. I just want to ask you something now about your view about the way in which mines ought to manage risks of which they are aware before production in a longwall commences, because it's something that you touch on in your statement and I just want to be quite sure that I understand your view about this. In your statement, you make the point that once production commences in a longwall, longwalls are designed to keep moving?
A. That's correct.

Q. And that there are risks attendant upon stopping production, once production has commenced?
A. Yes.

Q. I think you adverted to the risk of the development of spontaneous combustion, for example?
A. As certainly one of them, yes.

Q. But there are also risks, aren't there, if - once production in a longwall has started and hazards manifest themselves, there are risks in not stopping production; is that as I understand your opinion about these matters?
A. I'm sorry, I'm not sure I'm following the question --

Q. I'll see if I can ask it again.
A. -- clearly.

Q. As I understand it, what you say in your statement is that longwalls, being designed to keep moving once they start, there are risks both with stopping a longwall and with continuing a longwall in circumstances of certain hazards, for example, methane exceedances?
A. Yes, that's correct. Yes, that's correct. An example occurred just recently where we did stop the longwall. Circumstances had developed where that was the only acceptable action to take.

Q. Sometimes that will necessarily occur if the

inspectorate gives a directive to a mine?
A. That's right.

Q. But, in any event, sometimes it will be necessary for a mine, completely independent of the inspectorate's views or involvement, to consider stopping production if risks or hazards are manifesting themselves in a way that suggests it's unsafe to continue?
A. Yes.

Q. It's important, then, in that context, isn't it, for a mine to manage methane, and the levels of methane production during production of a longwall, well before production commences?
A. It's important that the mine understand what the risks are going to be with producing, in terms of what they are going to have to do to manage the methane, whether they need to, and how much they need to, pre-drain before they commence and how much post-drainage they may require.

Q. All right, attention needs to be given to those matters before production commences?
A. Before, that's right.

Q. And that would be particularly so, I imagine, where a mine is intending to mine in a gassy area?
A. Particularly so, yes.

Q. Because, of course, when a mine intends to mine a gassy area and methane is not proactively managed by way of active pre-drainage beforehand, there are risks that there's going to be excess methane production during the production of the subsequent longwall?
A. That is a risk that they have to manage, yes.

Q. I want to ask you something about longwall 103, and of course you were taken through a number of documents related to the methane exceedance HPIs that occurred on that longwall before lunch by Mr Hunter.
A. Yes.

Q. I'm not going to go back over the detail of that, but as I understood your evidence before lunch, you were aware that as a result of the HPIs that occurred on longwall 103, by the end of 2019 Grosvenor had had, in the last six months of that year, difficulties of one nature or another in managing methane on the longwall?

A. Yes.

Q. And you explained to us in some detail - again I don't propose to go into it - the nature of those difficulties ranging from things like their ventilation set-up through to gas drainage capacities, that sort of thing?
A. Yes.

Q. You saw a progression of the mine attempting to manage the methane exceedances they were experiencing by developing plans to address all of those areas - the ventilation, gas drainage capacity and the like - in order to reduce the HPIs?
A. Yes.

Q. Nonetheless, although at a reduced rate, the mine continued to experience HPIs throughout the life of longwall 103?
A. They did.

Q. I want to ask you something about a meeting that the inspectorate - not you, but some of your inspectors - had with Grosvenor mine on 15 October 2019.
A. Yes.

Q. This, of course, is a meeting that took place during the life of longwall 103, but it's a meeting which related at least in part to the mine's plans with respect to 104. So I'd like to go to that MRE and ask you some questions about it.

Might we pull up, please, document RSH.002.145.0001. You refer to this document and to this meeting, Mr Smith, at paragraph 108 of your statement.
A. Yes.

Q. If we can zoom in a little bit, if it's possible, to make the font a little larger, we can see there, can't we, that this is a mine record entry produced subsequent to an attendance by the inspectorate at Grosvenor on 15 October 2019?
A. That's right.

Q. The inspectors who were present at that time were Mr Brownett and Mr Nugent?
A. That's correct.

Q. We can see set out there under the heading "Opening Meeting" a number of things that those inspectors were told by a number of members of the Grosvenor team at that time, comprising Mr Mohr, Mr Hearne and Mr Bryant?
A. That's right.

Q. I want to go to two of the bullet points under that heading because these are the matters that relate to 104. We can see in the third bullet point the words:

The current in situ gas content (methane) 101-103 panels is 2-3 cubic metres per tonne.

A. Yes.

Q.

Panels beyond 104 begin to experience increased in situ gas content [in excess of] 6 cubic metres per tonne and as high as 15 cubic metres per tonne in the most deepest parts of the mine lease.

A. Yes.

Q. Next we have the statement:

An underground inseam gas drainage program has commenced to achieve effective gas management.

A. Yes.

Q. Do you understand from this document or from any other knowledge that you have of that meeting that what Grosvenor was informing the inspectorate at that time was that it did have in place plans for underground inseam gas drainage for longwall 104?
A. I would not infer that from that sentence, no, because 104 panel is very close to - 103 is not far from finishing. 104 is the next one. I read that as being that it's more to do with 105, 106, because they've highlighted those panels as being much higher gas content than the existing ones.

Q. In particular, what appears from the wording on that document is that the higher gas content level which

warranted an underground inseam gas drainage program was the exceedance of 6 cubic metres per tonne level?
A. As I would read it, yes.

Q. We'll come to another document to see if it might relate to 104, but I'm happy to leave that bullet point alone for the moment. If we could just move to the next one, we can see there, can't we, that Grosvenor informed the inspectorate, or the two inspectors there on that day:

> *Gas emission hazards are expected in [longwall] 104 due to gas management treatment had not been developed and implemented at time of development.*

A. Yes.

Q. Do you understand that statement, either from this document or from other knowledge you have of that meeting, to be information being given to the inspectorate that there were hazards expected in respect of gas emissions because longwall 104 had not been treated, ie, pre-drained?
A. That's right.

Q. As I understand it from your statement - I don't need you to go there unless you disagree with that proposition - it's your view that this MRE indicates that the mine was aware that it would need to manage its methane very carefully in longwall 104?
A. Absolutely, as they've indicated to the two inspectors, that their methane drainage, their pre-drainage, was not going to be sufficient for them to produce without taking great care.

Q. Do you know, yourself, sitting here today, that in fact Grosvenor had not pre-drained the P seam in advance of mining longwall 104? If you don't, I can take you through a document. We can talk about it.
A. I've become - when I was reviewing the documents, it became clear that they hadn't completed the P seam drainage strategy that they intended, but I have not explored exactly how far they intended to go.

Q. All right. I will take you to one extra document and we'll see if this assists. Could I ask that RSH.002.030.0001 be pulled up, please. This document, Mr Smith, you'll recognise as being an attachment to your

statement.
Yes.

Q. You'll recognise it as being a particularly large document. I don't need to take you to very much of it. A hard copy is being provided to you if you want it, Mr Smith.
A. Thank you.

Q. Could we go, please, to only two pages. If we could start at page 64. Obviously we're not on the front page of this document, Mr Smith, but you'll agree with me that it's the secondary extraction risk assessment which was completed on 4 December 2019 in respect of longwall 104?
A. Yes.

Q. If we could go to page 64 of 111, so another three pages down this document, please, hopefully you can see there, Mr Smith, some words with the heading "Pre-drainage"?
A. Yes.

Q. I should just confirm this document comprises one of the documents that was provided by Grosvenor to the inspectorate in advance of commencement of production of longwall 104, wasn't it?
A. Yes.

Q. And it would have been a document which was reviewed by the inspectorate before mining was commenced?
A. I can't recollect the date that it was received. I think it was received in the first week of March, and the longwall started on 9 March.

Q. Yes.
A. So in terms of how soon ahead of the longwall commencing, the date 6 March sits in my mind, but I may be incorrect.

Q. In any event, it would have been provided to the inspectorate prior to commencement of longwall 104?
A. Commencement, yes, yes.

Q. We can see there some information being relayed with respect to pre-drainage that either had or had not occurred in respect of longwall 104; correct?
A. Yes.

Q. There's information there in the first bullet point that pre-drainage of the GM seam - that is, the seam to be mined - had in fact been undertaken?
A. Yes.

Q. And in the second bullet point, we can see these words:

> *Pre-drainage of the P-seam over LW104 has been conducted from SIS Boreholes drilled from Arrow.*

Do you see those words?
A. Yes.

Q. Is it your understanding that that's a reference to drilling that had been undertaken by Arrow some years earlier as part of a quite separate exercise by Arrow?
A. I must say I've not explored that with the mine at all, but it would not surprise me, because, as I understand it, Arrow are the organisation that take the methane product from the mine and they've done drilling at the mine, so your description works.

Q. If you're not personally aware, I won't pursue that. If we can look at the next sentence, then:

> *[Underground inseam drilling] of the P-seam was attempted from MG104, 22c/t that resulted in 837 metres of drill string being stuck in the P-seam inbye of MG104 22c/t.*

Do you see that?
A. Yes.

Q. Was it your understanding either at the time or subsequently, as a result of perhaps reviewing the form 5As for some of the HPIs, that that meant that pre-drainage of the P seam had in fact not occurred as the mine had planned it to be done?
A. That's correct.

Q. And, finally, the third bullet point confirms that there hadn't been any pre-drainage of the GML seam?
A. That's correct.

Q. If we could go, please, Mr Operator, two pages further along, page 66 of 111, and if it's possible to zoom in a little on the top, can you see here, Mr Smith, the information which reads:

> *Gas content from previous cores taken from 2017 onwards indicates that the P-Seam gas content varies from 4-6 cubic metres per tonne at the commencement of the longwall block.*

A. I can see that, yes.

Q. So getting up towards the limit of 6 cubic metres per tonne that was warranting pre-drainage?
A. Yes.

Q. Then:

> *There will be increased goaf emissions until LW104 meets the install roadway of LW103 as there will be gas desorbing from 3 sides, instead of 2. Diagram below for description.*

Can you see that?
A. Yes. I can.

Q. Can you see towards the bottom-left corner of the diagram that has been pulled up there, there's a pinkish square?
A. Yes.

Q. It's being pointed to with these words:

> *Potential P-Seam Desorption from commencement of LW104.*

A. Yes.

Q. That appears, doesn't it, to be an indication that that was the area of expected increased goaf emissions?
A. Yes.

Q. That covers an area beyond that which was being mined as of 6 May 2020?

A. Yes.

Q. It's fair to say, isn't it, that longwall 104 is structured on a down-dip type alignment?
A. Yes.

Q. That might not be a very technical description.
A. No, no, it runs down dip, yes.

Q. From the inbye end to the outbye end of the longwall?
A. From the mains to the install face of the longwall.

Q. It goes down on the dip?
A. Down dip.

Q. All right. So the mine was expecting that there would be increased gas emissions towards the end of longwall 104?
A. Yes.

Q. I think you confirmed for me - we can put that document down, please, Mr Operator - that that was a document which would have been provided to the inspectorate prior to the commencement of mining, which you knew started on 9 March 2020?
A. That's right.

Q. That brings us to starting to walk through each of the HPIs that occurred on longwall 104. We know that there were 14 methane exceedance HPIs that occurred on longwall 104 before 6 May 2020. That's right, isn't it?
A. There were 14 notified, yes.

Q. Fourteen notified. That may well be a reference to the fact that you've seen documentation that suggests there were further exceedances above 2.5 per cent which were not notified to the inspectorate?
A. It does.

Q. Just to be clear, what I'm referring to at this point in time - we'll come to those later - is the fact that from 9 March 2020 through to 6 May 2020, we're talking about 14 occasions on which there were methane exceedances in excess of 2.5 per cent notified to the inspectorate?
A. Yes.

Q. You understand that what I want to do now is talk to you, talk you through those documents that were provided to

you in respect of those HPIs?
A. Yes.

Q. The first of the HPIs occurred, did it not, on 18 March 2020?
A. It did.

Q. In fact, the first and the second HPIs were notified to the inspectorate when one of the inspectors was at the mine conducting an inspection?
A. That's correct.

Q. Now, the inspector who was there was Inspector Brownett, and he was at the mine on 19 March 2020?
A. That's right.

Q. And as you understand it, he was there in respect of an entirely different topic, nothing to do with methane exceedances?
A. A general inspection.

Q. A general inspection, a planned inspection?
A. Yes, a planned inspection.

Q. When he was there, he was verbally notified by Mr Niehaus that there had been a methane exceedance the night before?
A. Yes.

Q. Whilst he was there, there was a further methane exceedance?
A. That's right.

Q. Could we go, please, to the form 1A for the first of the exceedances. This is document AAMC.001.009.0288. Now, is it the case, Mr Smith, that it's your understanding at least that Mr Brownett was informed that the cause of this particular HPI was that the ventilation had scoured the goaf and pulled some of the goaf gases out from behind the shields while the shearer was down in the tailgate area?
A. Yes.

Q. That being the case, if we could go down a little bit, please, Mr Operator, to see the content of this form 1A, we can see, "Longwall 104 tailgate methane exceedance - while cutting into tailgate shearer positioned at shield 140 had

a spike of 2.56 per cent on the inbye tailgate sensor at 9.33pm and outbye sensor peaked at 2.3 per cent at 10pm"?
A. Yes.

Q. If we could go to the second page and if we could zoom in on the three bullet points towards the top of that document, we can see there the mine's provision of information to the inspectorate about which of the sensors recorded the exceedance?
A. That's right.

Q. And for how long?
A. Yes.

Q. And in fact we can see that the exceedance occurred on the inbye sensor?
A. That's right.

Q. That it peaked at 2.56 per cent and that it was over 2.5 per cent for 2 minutes?
A. Yes.

Q. Now, there wasn't any cause, any particular cause, identified for that methane exceedance on that form, was there?
A. No, there wasn't.

Q. We'll go, then, to the form 1A for the second HPI. This is document AAMC.001.009.0290. This is the form 1A, Mr Smith, for the exceedance which occurred on the morning of 19 March 2020, when inspector Brownett was at the mine?
A. Yes.

Q. And if we go down a little bit on the first page, we can see the description of the event?
A. That's right.

Q. We can see there that the description related to double-chocking having occurred at shields 125 through to 138 for the purpose of maintenance activities?
A. Yes, that's right.

Q. And an exceedance of 3.01 per cent occurring on the inbye sensor at 6.50am?
A. Yes.

Q. There's the information provided there that at the

time of that event, the shearer had been on stop for 175 minutes prior to the event?
A. That's right.

Q. Again, if we could go over to the second page and zoom in on the bullet points towards the top, again this form helpfully identifies which sensor the exceedance occurred on?
A. Yes.

Q. And again for how long --
A. Duration.

Q. -- the reading was over 2.5 per cent?
A. Yes.

Q. On this occasion, the peak was 3.01 per cent methane on the inbye sensor?
A. Yes.

Q. And it was over 2.5 per cent for a period of 43 minutes?
A. Yes.

Q. If we go just a little further down that document, under the heading "Goaf Drainage Comments", we can see that the mine provided information that goaf skid GMS11 on goaf drainage hole GR04V002A had been experiencing filter blockages up with fine material.
A. Yes.

Q. That those blockages had restricted the hole flow and contributed to that gas exceedance?
A. Yes.

Q. And the mine noted there that going forward a dual skid would be set up on that hole to allow cleaning of the filters without compromising goaf drainage.
A. That's what they say, yes.

Q. You in fact confirmed that the dual skid was set up by the mine in due course?
A. That was confirmed in - it's confirmed in one of the LFIs that they did actually do that.

Q. So a review of one of the LFIs confirmed to you that that was done in due course?

A. Yes, yes.

Q. Now, I don't propose to go to the form 5As at the moment. What I propose to do is walk through the exceedances and the notifications chronologically.
A. Yes.

Q. As you adverted to a little earlier, the form 5As don't follow immediately upon receipt of the form 1As. In fact, there's a delay while the mine investigates the cause of the exceedance?
A. That's right.

Q. So we'll come back to the 5A for this and other matters. We'll just stick with the chronology for now. So if we could go, then, please to document AAMC.001.009.0294, the next exceedance in time occurred the next day - that is, on 20 March 2020; is that right?
A. That's right.

Q. So we'd had the exceedance on the evening of 18 March, one on the morning of 19 March, and we're up to the third one on 20 March 2020?
A. That's right.

Q. In fact, there were three on this day?
A. That's right.

Q. We can deal with the first one. This is the form 1A in respect of the first exceedance. It was verbally notified by Mr Niehaus to Mr Brown, Inspector Brown. Can you see that?
A. That's right.

Q. And then the form 1A came in in due course. We can see, if we scroll a little further down the page to the description, the description provided in respect of that exceedance there, Mr Smith?
A. Yes.

Q. There's reference to the shearer having been stopped at shield 108 so that maintenance could be undertaken to clean the flame arrestor on GSM11?
A. That's right.

Q. And that while cleaning was being undertaken, the inbye sensor went to 2.51 per cent at 2.20am and then

peaked at 2.84 per cent at 2.30am?
A. That's right.

Q. If we go over the page, please, Mr Operator, again we can zoom in on those three bullet points to identify which sensor picked up the exceedance and how long the exceedance was present for. We can see the exceedance was picked up firstly on the inbye sensor, with a peak of 2.84 per cent and a duration of 26 minutes?
A. Yes.

Q. Subsequently there was a detection on the outbye sensor also, with a peak of 2.57 with a duration of 11 minutes?
A. That's right.

Q. If we could zoom in a little on the information provided underneath that in respect of "Goaf Drainage Comments", we can see that this form 1A contains much the same information as had been conveyed in respect of the previous form 1A, that is, that the same goaf skid had been experiencing filter blockages?
A. That's right.

Q. And that, as a result, going forward there was going to be a dual skid set up so that when maintenance was occurring, there was less risk of this occurring again?
A. That's right.

Q. So that's the first HPI on 20 March. You are aware that there was another one about an hour later, at 3.30 in the morning.
A. Yes.

Q. If we could pull up AAMC.001.009.0297, Mr Operator, we can see that this exceedance was also notified to Mr Brown by Mr Niehaus - in fact, both of these HPIs were notified at the same time?
A. At the same time, yes.

Q. Again, if we scroll down a little, we can see a little bit of the information provided about the exceedance, that being that whilst cutting into the tailgate the shearer was at shield 133 when a methane exceedance occurred, the maximum methane detected was 2.55 per cent at the inbye tailgate sensor.
A. Yes.

Q. Again, if we go over the page to page 2, we can see that this time it was only the inbye sensor which picked up the exceedance?
A. Yes.

Q. That the peak value was 2.55 per cent?
A. Yes.

Q. And it lasted only a minute?
A. Yes.

Q. Finally in respect of this HPI, if we go down a little bit, we can see that the same words are used in respect of this form 1A as the earlier one and the one before that?
A. Yes.

Q. That is, there were continuing problems with maintenance causing these exceedances?
A. Yes.

Q. There was a third HPI on this day, 20 March, which you personally, as I understand it, were notified about in the afternoon?
A. I was yes.

Q. It occurred at about 2.36pm?
A. Yes.

Q. So some 12 hours or so after the first one that day?
A. Yes.

Q. Could we go to document AAMC.001.009.0300. If we can scroll down to towards the bottom of that document, there's the description there?
A. That's right.

Q. Again, the shearer was cutting, but this time from the tailgate to the maingate?
A. Yes.

Q. It was stopped because of one of the sensors exceeding 2 per cent?
A. Yes.

Q. And gas levels continued to rise, such that at 2.36pm they reached 2.5 per cent on the inbye sensor, increasing

to a peak of 3.55 per cent at 3.03pm?
A. Yes.

Q. If we could go to page 2 and again just zoom in on those three bullet points so that we can see the exceedances, where they were picked up and how long they lasted on this occasion, here we can see that the exceedance was first detected on the inbye sensor, that the peak was 3.55 per cent?
A. Yes.

Q. And that the duration was 58 minutes?
A. Yes.

Q. We can also see that on this occasion, the outbye sensor recorded a peak of 3.1 per cent?
A. Yes.

Q. And that the duration on that occasion was 57 minutes?
A. Yes.

Q. We can also see that the cause was at that time thought to be very much related to the earlier ones, although described in slightly different detail, but had to do with the maintenance of the same goaf drainage hole?
A. It was related to the same goaf drainage hole and the equipment on it. A difference between this particular exceedance and the previous three - this exceedance actually shut the hole, the goaf hole off, whereas the other ones where the filters are blocked reduced the flow from the hole. So in this particular instance, the CO2 - what's described as the CO2 cylinder has activated a hole protection system and closed the hole. So it's not just some of the flow from the hole being restricted; it's the whole lot has been prevented from --

Q. Operation?
A. -- being removed, yes.

Q. On this day, 20 March 2020, the inspectorate didn't take any further action, having received the notification of these HPIs and the earlier ones on 18 and 19 March?
A. No, I didn't deploy anyone to the site.

Q. You did, though, have a telephone call with the underground mine manager that afternoon, I think, but in respect of another matter?

A. It was the UMM who called me with the notification, that particular notification. That was the conversation - in that conversation he informed me that, "Again we've lost the goaf hole", the same as the previous two exceedances that he'd reported to Inspector Brown that morning. It was different from - whereas those two were the filter arrestors were blocking, in this particular instance the hole had been shut. The CO cylinder had unexplainedly emptied itself, which activated the protection mechanism on the hole. I took that as being human error with regard to the set-up on the sled itself, and that human error would be corrected.

Q. You satisfied yourself at that time that that was the extent of the issue for the mine?
A. That's right, and he did speak to the additional skid being procured and put into place so that in the event of future events, they'd have the ability to swing across to the other device and maintain extraction from that hole at appropriate levels.

Q. Did that person tell you or did you otherwise have knowledge at that time of the HPIs that had occurred the two days previously, on 18 and 19 March?
A. I was aware of the other ones. We'd had a meeting actually that morning with myself and Inspector Nugent and Inspector Brownett, which was the day following Inspector Brownett's inspection. So we were aware - I was aware of those other exceedances and --

Q. Did you ask Mr Niehaus whether, given those five exceedances in those couple of days, there was anything going on that he was concerned about?
A. No, I did not.

Q. Did it raise any concerns in your mind that the mine had, within such a short period of time of the 104 take-off, had five exceedances in a period of a little over 48 hours?
A. The failure of the goaf sled arrangements to adequately remove gas from the goaf explained for me why it was reporting to the tailgate. Their solution of adding the second sled, in my mind, would adequately address that, provided it had the same capacity, and so in terms of actions that the mine could take, that seemed appropriate to me.

Q. Let's move forward, because the next HPI occurred two days later, didn't it, on 22 March 2020?
A. That's right.

Q. In fact, again you personally received verbal notification of this HPI?
A. Took this call, yes.

Q. And you were informed about it by a telephone call in the evening of 22 March?
A. That's right.

Q. And were told that the incident had occurred at about 10.22 that morning?
A. That's right.

Q. Could we bring up, please, document AAMC.001.009.0304. This is, isn't it, Mr Smith, the form 1A in relation to the sixth HPI?
A. It is, yes.

Q. If we go down to the bottom of that page to the description of it, we can see there there's a lengthy description about what the shearer was doing at the time of the exceedance?
A. Yes.

Q. And there's reference to the goaf drainage plant having tripped for a number of minutes, 12 minutes, when the electrician was carrying out some work on it?
A. Yes.

Q. If we go over the page, please, and zoom in on the bullet points, let's just have a look at the sensors that were activated and the peaks which were detected.
A. Yes.

Q. We can see here that the inbye sensor detected the methane first and that there was a peak of 2.54 per cent methane?
A. Yes.

Q. The duration of that exceedance was 3 minutes?
A. Yes.

Q. And then the outbye sensor recorded a peak of 2.54 per cent for a duration of 6 minutes?

A. Yes.

Q. If we scroll down just a little further, we can see some further comments provided by the mine to the inspectorate explaining the work that was being carried out on the goaf plant at the time?
A. Yes.

Q. And the fault that had occurred and the explanation for the exceedance?
A. Yes. Again, human error in terms of believing we have put an adequate control in place to ensure that what we were about to do will not close the hole and then discovering that it wasn't adequate and it did close the hole, and again all the methane, instead of coming out the hole, or even at a reduced amount - none, so it must report to the tailgate.

Q. You were satisfied, as I think you've just indicated, that this incident must have been a result of human error?
A. Yes.

Q. And didn't take any action at that time in respect of this HPI?
A. No, I didn't. I didn't decide to deploy anyone or myself. Again, it was in light of we're setting a second goaf sled in place to try to avoid these occurrences in the future.

Q. Let's move forward in time by a day, because the next HPI occurred on 23 March 2020, didn't it?
A. Yes, it did.

Q. This is HPI number 7?
A. Yes.

Q. Again, you were the person who received notification of this exceedance?
A. I was.

Q. You received a telephone call some time in the evening and were informed about the event having occurred at about 6.28 that morning?
A. Yes.

Q. As I understand it from your statement, you were informed this time that the goaf hole hadn't failed, but

the mine had experienced a pressure change which kept the drainage restricted and overpressurised the goaf?
A. Yes.

Q. What did that explanation mean to you?
A. In my mind, it was linked again to issues with the goaf sleds on the surface and the people that worked with those. However, there was also - it was not a conclusive finding, because the goaf hole did continue to - did actually continue to extract methane from the goaf, and, as I took it, they hadn't quite - they hadn't convinced themselves that they actually knew the complete reason for the exceedance.

Q. Was all of that conveyed to you in the verbal notification, was it?
A. Yes, and confirmed when the form 1A is emailed to me by the mine as well, for this.

Q. Let's go to the form 1A. Could we have document AAMC.001.009.0307, please, and if we could zoom in on the explanation down the bottom of the first page, we can see there the mine informing the inspectorate that:

> *A change in longwall 104 goaf has occurred resulting in a change in pressure in goaf drainage hole ... 001.*

A. Yes.

Q. So this is a different hole to the one involved in the earlier HPIs?
A. Yes.

Q. Because that was the hole ending 002?
A. 002, yes.

Q. The information that you were provided with was that the suction pressure from the goaf skid and the plant was less than that produced by the goaf, hence the methane reporting to the tailgate roadway?
A. Yes.

Q. There's an explanation there tying the issue to the detonation arrestor?
A. That's right.

Q. If we go over the page, please, and again zoom in on those three bullet points, you were informed - by "you", I mean of course the inspectorate - that this exceedance was picked up on the outbye sensor?
A. That's right.

Q. The peak value was 2.55 per cent?
A. Yes.

Q. And the exceedance lasted 95 minutes?
A. That's right.

Q. I think you drew some conclusions, if not at this point in time but a little later, about why it was that it was the outbye sensor and not either what's described there as the 0.1 metre shield 149 sensor or the inbye sensor which picked up that exceedance?
A. That's right.

Q. What was that conclusion ultimately?
A. That the methane was either reporting to the outbye sensor, possibly from leakage through the seals between 104 and 103, or potentially exiting the 104 goaf into what they call C heading and circumventing - being able to pass down a roadway with no sensor in it before rejoining the roadway inbye of the outbye sensor.

Q. Do you know whether any questions were asked by anyone at the inspectorate of anyone at the mine as to why that had occurred?
A. I did not ask any questions at that time, no.

Q. On that occasion, you didn't take any action?
A. No.

Q. If we can move forward, then, the next methane exceedance HPI on that longwall occurred on 4 April, didn't it?
A. That's right.

Q. Could we bring up document AAMC.001.009.0310. On this occasion, Mr Smith, it was Inspector Kennedy who received the verbal notification from the mine?
A. That's correct.

Q. And he was notified about that via a telephone call in the afternoon in respect of this event, which was described

as having occurred at some time around 2.22 that morning?
A. Yes.

Q. If we can scroll down towards the bottom of this page, please, Mr Operator, to the description of the incident, we can see the mine informing the inspectorate that at that time - that is, at 2.22am - the shearer was cutting from the tailgate towards the maingate when the shearer lost power on what's described there as the 0.1 metre sensor?
A. Yes.

Q. And because it had reached 2 per cent, which was how it was calibrated at that time?
A. That's right.

Q. And after that, a gas exceedance occurred on the 0.1 metre tailgate sensor due to the goaf stream coming out between 147 and 148 roof support?
A. Yes.

Q. If we go over the page again and zoom in on those bullet points, here we can see that - well, what was informed on the first page is repeated here?
A. That's right.

Q. It was the 0.1 metre chainage sensor which picked up the exceedance?
A. Yes.

Q. That the peak value of it was 2.97 per cent?
A. That's right.

Q. And that it lasted about 2 minutes?
A. That's correct.

Q. Now, there were some exceedances on the other sensors, but none exceeding 2.5 per cent?
A. The other sensor - neither of the two sensors passed 2 per cent.

Q. Sorry, let me correct myself. There were some peaks identified there, neither of which were exceedances?
A. No, no.

Q. So it was only the first sensor, the one closest to the face, which was picking up that methane exceedance?
A. That's right.

Q. On that occasion - that is, on 4 April 2020 - the inspectorate didn't take any action?
A. Didn't deploy to the mine, no.

Q. Were you or someone else given any further explanation than what we can see on the face of the document - that is, that the goaf stream had come out and was passing over the 0.1 metre shield?
A. At the time, I don't recall any further details, no.

Q. Do you think that further questions by this point in time - that is, the exceedance on 4 April, being the eighth HPI - ought to have warranted any further questions by anyone from the inspectorate?
A. This particular exceedance was the first exceedance measured or notified on the canopy, on the canopy sensor. Now, following the meeting with Inspectors Nugent and Brownett back on 20 March, we formed the view that the mine possibly had the sensor required by regulation 243A in the wrong place, so when this - and they were using this particular sensor as that sensor. So in the context of receiving this one, this exceedance, it's the first one on a sensor at the canopy tip. The location of the other two sensors - one is roughly where the 243A sensor should be, and the one further outbye - in both cases - or in neither case did they see significant volumes of gas, and this one saw some gas for a short duration, relatively short duration. Given the location of the sensor and our concerns about it, in my mind - and given the path we'd started on with regard to determining the appropriate locations of the sensors at all three mines, I decided not to take any further action in terms of sending anyone to the mine for this. We would see through the activity with regard to the canopy sensors first.

Q. Do I take it from that answer that it was the inspectorate's view that because this exceedance could be differentiated from the others, in the sense that it was being picked up on the 243A sensor - I'll call it the 149 shield sensor, perhaps - that there was a different explanation for the cause of this one such that further investigation wasn't warranted at that point in time?
A. Because of its location, there's a high likelihood it's not measuring the general body of the airway, so there's a possibility it's measuring a layer of methane that's come out. In this case they described it as coming

out between the shields close to the tailgate. So it's a different nature and, as I say, it may not necessarily be measuring general body. So we checked the sensors that are measuring general body to see what they tell us.

Q. Is there a difficulty, do you think for the inspectorate to view individual notifications as they come through with an eye to seeing if they can rationalise how that particular exceedance might have occurred, and if they can, that is in this case thinking through that maybe this sensor was picking up layering because the other sensors didn't pick them up, and having formed that view or reached that rationalisation about the HPI and how it might have occurred, is there a risk in ceasing the full process there and not taking the next step and thinking, well, why is it that in less than a month, a mine's exceeding seven, eight HPIs? Is there a risk in not taking the analysis a little bit further?
A. I'd suggest that given that five of the HPIs were all associated around the goaf sleds and all in very close time proximity to one another, and that the mine had initiated a resolution to that by adding the extra sled to it, in my mind the mine has actually resolved that problem and we should not see, or we'd be highly unlikely to see any further exceedances caused by that same mechanism, if you like. So you're correct, by that stage there had been eight exceedances, but packaged, five of them, to my way of thinking, had been - the mine had reached resolution for.

Q. Because up until this point in time, all the inspectorate had been receiving was the disparate form 1As, not the form 5A, which was addressing the underlying issues?
A. Not 5As, no, but I did have the benefit of receiving three of the exceedances directly, all related to, or potentially related to, the goaf sleds, and I was aware immediately - made aware by the UMM immediately of the first one, that there had two previous, that morning, with the goaf sleds. So I had the picture of the grouping, if you like.

Q. What I'm getting at is at least up until the point of 4 April, what you both personally and the inspectorate more generally had been told was that whilst there had been a number of HPIs, there were discrete explicable reasons for each of them which were being addressed by the mine?
A. Yes.

Q. And you hadn't at this point in time received any form 5As addressing any underlying causes?
A. No, not that I'm aware of, no.

Q. We'll wait until we get to those and I'll come back to whether or not there's reason for more questions.
A. Yes.

Q. Let's move, then, to 7 April, because that's the next date that exceedances occurred. Am I right?
A. Yes.

Q. The inspectorate was notified about two exceedances on that day, the ninth and the tenth HPIs?
A. That's right.

Q. Inspector Brennan received notification of both of those HPIs by way of telephone call in the afternoon; correct?
A. That's right.

Q. But the first of them in fact occurred at 11.31 the evening before, on 6 April?
A. That's right.

Q. And the second occurred at 2.21 in the afternoon of 7 April?
A. That's right.

Q. Let's deal with the first one, the one that occurred late in the evening on 6 April, and if we could go to document AAMC.001.009.0319, please, you can see there, Mr Smith, that this is the form 1A in respect of the incident that we were just talking about?
A. Yes.

Q. If we scroll down towards the bottom, you will be able to satisfy yourself that this is the exceedance that in fact occurred on "6 March"?
A. That's right.

Q. It says 6 March, but we're in fact talking about 6 April, of course. That's right, isn't it?
A. That's right.

Q. We can see the description there being that the

shearer was cutting towards the tailgate on this occasion when it stopped via automation at approximately 11.09pm because methane had exceeded 1.8 per cent on the inbye sensor?
A. Yes.

Q. That 22 minutes after the shearer was stopped, the outbye sensor reached 2.5 per cent methane?
A. Yes.

Q. Then it peaked at 2.56 per cent and the duration of the exceedance was about 6 minutes?
A. That's right.

Q. If we go to page 2 just for a matter of completion - page 3, rather - we can see that that's confirmed in the content there in respect of those two bullet points?
A. In that detail, yes, that's right.

Q. There is a slight discrepancy, though, isn't there, because here it's said that on the outbye sensor the duration was 12 minutes, not 6?
A. Six minutes, yes.

Q. If we go down a little, there's some further description there of the ERZC's inspection of the tailgate
A. Yes.

Q. And what the inspectorate was notified about here was that the deputy had gone and conducted an investigation in respect of C heading and found some brattice that had been disrupted potentially as a result of a goaf fall?
A. Yes.

Q. The issue was fixed by way of installing pogos on the inbye side to right the brattice again but also hopefully to prevent suck back in the event of any further goaf falls?
A. Yes, when the goaf falls, the air is pushed in one direction, which leaves a bit of a vacuum from where it's been pushed from, so there's a natural return of air, which is the suck back description used.

Q. If we just go back up to those two bullet points, that description would sit quite comfortably with the fact that the inbye sensor hadn't received or hadn't detected an exceedance whilst the outbye sensor had?

A. That's right.

Q. Suggesting that any methane which is detected on the outbye had in fact bypassed the reading on B heading, on the inbye sensor?
A. That's right. It didn't come out the tailgate beside the shields and go past the tailgate drive equipment. The excess methane that took it to an exceedance went out through the cut-throughs in the goaf into C heading and was drawn outbye from C heading and then back across into the B heading tailgate roadway on the outbye side of the sensor.

Q. Let's go, then, to the next exceedance, which is the one that occurred in the morning of 7 April. Sorry, I said "in the morning". It was early in the afternoon of 7 April. We'll need document AAMC.001.009.0315, please, Mr Operator. Here is the form 1A for the second of the two notifications that your office received that day, Mr Smith?
A. Yes.

Q. And if we scroll down the page, we can see the description of the exceedance?
A. Yes.

Q. We can see reference there to additional methane make in the inbye C heading roadway?
A. Yes.

Q. And it seems to be a similar issue that had been experienced the night before, on 6 April?
A. Potentially, yes. Yes.

Q. If we go over the page and again over to those bullet points, please, and zoom in on those, we can see that here again, like the previous one, there was no reading on that inbye sensor - sorry, no exceedance detected?
A. No exceedance, no, but --

Q. And the exceedance detected was on the outbye sensor?
A. Yes.

Q. There was a peak value of 2.52 per cent methane?
A. Yes.

Q. And the exceedance lasted around 6 minutes?
A. Six minutes, yes.

Q. We can see there the action taken has been highlighted: the ventilation officer and the underground mine manager were informed; the deputy waited for tailgate 104 three-four cut-through B heading to fall below 2.5 per cent?
A. Yes.

Q. Before presumably continuing production?
A. Yes.

Q. Now, on that day, like the previous days, the inspectorate didn't take any action in respect of notification of those HPIs?
A. Apart from receiving them, no. No, we didn't take - intervene at the mine or intend to intervene at the mine as a direct consequence of those, no.

Q. I started to ask you earlier about whether there would be some benefit in continuing - that is, the inspectorate continuing - some analysis when confronted with a number of HPIs being notified to it, and we stopped that discussion because at that point in time, that is, early in April 2020, the inspectorate hadn't been given any of the form 5As in relation to any of those HPIs that we've spoken about, had it?
A. No.

Q. In fact, it was on 15 April 2020 that the inspectorate received the form 5As for all of the March exceedances?
A. It would be.

Q. And when I say "all of the March exceedances", I'm talking of course about the seven HPIs that occurred in March?
A. Yes.

Q. All right, let's go through those. We can do this reasonably quickly. If I could ask for document AAMC.001.009.0388 to be brought up, please, Mr Operator. Mr Smith, can you confirm for us that that is in fact the form 5A that was received by your office on 15 April 2020?
A. Yes, I think I - yes, I can.

Q. As I've suggested to you, I'm going to take you through seven. We'll see in due course that all of them were received on 15 April.

A. Yes.

Q. I'll take you through them sequentially in terms of the order in which the HPI occurred.
A. Yes.

Q. So if we go to page 2 of this form 5A, down the bottom is a section headed "Incident causes". Can you see that?
A. Yes, I can.

Q. On that occasion, there were no organisational incident causes listed?
A. No.

Q. So let's go over to the top of page 3, please. There we can see under the heading "Task/environment conditions" these words:

> *No substantial evidence has been found to correlate the gas exceedance; the data would support a high goaf gas concentration being "scoured" by the shearer upon entering longwall 104 tailgate.*

Correct?
A. That's correct.

Q. That confirms what you had in fact been told about the matter right back on 19 March?
A. Back in --

Q. Okay. If we can scroll down a little bit further so we can see what's listed under "Preventative action", this is the section, is it not, where the mine sets out what control measures or actions are going to be either considered or implemented by it to hopefully prevent any further HPIs?
A. Yes.

Q. Let's go through what the inspectorate was told on this date. The first preventative action is listed in this way:

> *P seam drainage strategy for each longwall block to design & complete prior to longwall production phase.*

A. Yes.

Q. Then:

Investigate Citect alarm & messaging system failure and implement controls to prevent a re-occurrence.

A. Yes.

Q.

Document the IMT process currently used onsite for acknowledgement of action allocation & understanding.

A. Yes.

Q.

Investigate modifications to the goaf skid flame arrestor to allow the current fleet to be maintained whilst remaining in service.

A. Yes.

Q.

Ventilation network for longwall tailgates to assess for risk of failure when using dual return roadways.

A. Yes.

Q.

Amend the gas drainage TARP to add guidance for high flow goaf hole maintenance practices.

A. Yes.

Q. If you just keep that in mind as we move through the next form 5As, I'll ask for the next one to be brought up, and it is AAMC.001.009.0392. This is the form 5A received on 15 April in respect of the exceedance that occurred on 19 March, Mr Smith?

A. Yes.

Q. If we go to page 3 and if we could zoom in towards the

top there, you can see under the heading "Task/environment conditions" these words:

> *P seam gas drainage not completed to proposed strategy to allow longwall 104 unconstrained production from gas delays.*

A. Yes.

Q.

> *Lateral hole drilling experiencing numerous delays when drilling through fault planes.*

A. Yes.

Q. You understood either at the time or understand now that that's a reference to the fact that the mine had not in fact undertaken pre-drainage of the P seam as it had intended?
A. Yes.

Q. That's being listed there as one of the causes underlying the exceedance on 19 March 2020?
A. Yes, it is.

Q. Of course that's a cause which goes far beyond the precise and specific cause related to the maintenance of the goaf hole and the sled?
A. That's right.

Q. It's really identification of a fundamental problem that the mine had identified in respect of its investigation of the HPI?
A. Yes. It should be, yes.

Q. Well, it is, isn't it?
A. Yes.

Q. They're the words there?
A. That's what's in here, yes.

Q. That's what the mine is telling you it had identified as being the cause of that HPI on 19 March?
A. Yes.

Q. If we can look briefly at "Preventative action",

I don't propose to go through that in detail. You can probably satisfy yourself reasonably quickly that that's written verbatim to the words provided on the previous form 5A?
A. Yes, it is.

Q. Let's move to the next form 5A. This is document AAMC.001.009.0404. This document, Mr Smith, is the form 5A provided by the mine to the inspectorate on 15 April in respect of the first HPI that occurred on 20 March?
A. Yes.

Q. And if we could go over, please, Mr Operator, until we get to "Incident causes" and zoom in on the top part of that page, you can see there, Mr Smith, that the mine's identifying that as with the HPI on 19 March it had identified a fundamental problem or fundamental cause in respect of the HPI, being the insufficiency of the P seam drainage?
A. Yes, they have.

Q. And if you cast your eye a little further down, you will be able to satisfy yourself, I think, that those words with respect to the preventative action that was going to be taken by the mine are in precisely the same terms as the earlier form 5A?
A. They are.

Q. Could we go, then, to the next form 5A. This is for the fourth HPI, and the document number is AAMC.001.009.0408. Mr Smith, you can see there that this is the form 5A provided by the mine to the inspectorate on 15 April in respect of the second HPI it experienced on 20 March?
A. That's right.

Q. And if we go over to page 2 of 3, we can see towards the top of page 3 that again that same fundamental cause is identified as contributing to that HPI?
A. It is.

Q. And the same preventative action is listed in respect of that HPI?
A. It is.

Q. Let's just very quickly, for completeness, go through the final three. If we could pull up document

AAMC.001.009.0412, this is the form 5A provided on 15 April by the mine to the inspectorate in respect of the last of the HPIs on 20 March?
A. Yes.

Q. And we can see, if we go over to page 3, the same underlying cause is identified by the mine in respect of that exceedance?
A. It is.

Q. And the same preventative actions are listed?
A. It is - they are.

Q. Then if we pull up document AAMC.001.009.0396, this is the form 5A which relates to the sixth exceedance, the one that occurred on 22 March?
A. Yes.

Q. And if we go over to page 3, we can see essentially the same paragraph just repeated twice here, but the same paragraph in relation to the fundamental cause of the HPI and the same preventative actions listed?
A. That's right.

Q. Finally, if we go to document AAMC.001.009.0400, we have the last of the form 5As which were provided on 15 April, and this is the one that relates to the methane exceedance that occurred on 23 March 2020?
A. Yes.

Q. Again if we go over to the third page, the same fundamental cause is identified as contributing to that exceedance?
A. Yes.

Q. A further one is identified or nominated above it, and it relates to a failure of the Citect alarm system?
A. Yes.

Q. And the preventative action is in the same terms as the --
A. Previous ones.

Q. Could we keep that up for a moment. By 15 April, quite separately to the disparate or discrete notifications of each of the HPIs that had occurred up until that time, the mine had identified, had it not, an underlying cause of

the HPIs that it experienced in March?
A. Yes.

Q. And had provided this information to the inspectorate?
A. Yes.

Q. So that by 15 April at the latest, the inspectorate was well aware that against a backdrop of having received I believe 10 notifications by this time, the mine itself knew that it was having a number of these repeated exceedances because it had not drained the P seam as it had intended to do?
A. Yes.

Q. Does that suggest to you that the risk management process that you indicated to me right back at the beginning of these questions after lunch that a mine ought to undertake prior to production on a longwall had not been undertaken perhaps as thoroughly as it could?
A. It might indicate that, yes.

Q. Well, what else could it indicate?
A. The mine had indicated in October 2019 that longwall 104 presented to them a challenge with regard to managing the gas, so, as an inspectorate, we were aware of that, but that they were going to have to use operational controls to ensure that when they mined longwall 104, they kept the methane levels within the requisite limits. So we were aware already that their only course of action, practical action, to operating 104 was to use operational controls.

Q. Well, was it the only practical course of action open to it? I ask that in this context: by the end of 2019, the mine was aware and the inspectorate was aware that it had encountered a number of HPI methane exceedances on longwalls 101, 102 and 103. As you've just indicated, the mine was aware and the inspectorate was aware that the mine was not going to pre-drain the P seam before production of 104. Is that what you understood the case to be?
A. Yes.

Q. And your understanding was that in those circumstances, the only course open to the mine was to producing 104 and undertake ad hoc band-aid-type methods of controlling the exceedances?
A. They had to put in place rigorous operational controls

to manage how they produced the coal so that they didn't end up with gas exceedances, and they had demonstrated in the last four months or five months of longwall 103, although they did not eliminate all the exceedances in that time, they had demonstrated they were able to significantly reduce them in longwall 103, so they had demonstrated, to my way of thinking, that they had the capability to manage the face.

Q. Let's bring ourselves back to 104, though, because by 15 April, indeed by 7 April, the inspectorate had been notified of 10 exceedances on longwall 104?
A. Yes.

Q. Ten. And that's in the period between 9 March and 7 April, a period of a little less than a month?
A. Yes.

Q. I'd ask you to comment on whether that indicates that the mine had its methane management issues under control?
A. They weren't under control, but the reasons they were not under control were explained, if you like, in terms of the goaf drainage, the issue with the goaf drainage sleds as a discrete series of exceedances. That came in a flurry and was resolved and was resolved in a fairly short time. Then the next couple of exceedances were exceedances with less than adequate ventilation controls around the goaf edge that allowed methane to exit the goaf, head down C heading and go out the tailgate. So by the time these have arrived, there's been essentially two discrete groups of exceedances - associated with the sled and associated with controlling the methane that can exit the goaf and depart via C heading. And those things, in my mind, should be operationally controllable relatively easily, so not a significant - they're not a highly technical thing to manage.

Ventilation is basic mining. Managing brattice stoppings in a heading to prevent methane from moving into areas you don't want it to is basic mining skills. The failure of the sleds, the issues with the sleds, is recognising the need for basic maintenance. In terms of recognising a hazard, it was obvious that the mine hadn't considered the possibility that if they lost one sled out of three, the methane would report out the tailgate. They found that out as soon as they blocked the arrestors, that that's what would happen, so they've then gone into, "We

need to fix this", so I guess, to me, it's eminently fixable by the mine relatively easily.

Q. So can I ask you this, then: by 7 April, the mine had had 10 methane exceedance HPIs on longwall 104?
A. Yes.

Q. Do I take it from your answer just now that the reason the inspectorate didn't take any action at the time of 7 April or shortly thereafter was because it was the inspectorate's view that each of those exceedances were fairly basic and had a very simple technological solution?
A. Yes, that's certainly my view, yes.

Q. So these exceedances, so long as they were explicable by an immediate specific cause and one which, in your mind, had a simple technological solution, could keep occurring, and the mine would still be producing safely, such that the inspectorate didn't need to intervene? Do I understand that correctly?

MS HOLLIDAY: Could that question be broken down a little bit in terms of "it could keep occurring"? Is Ms O'Gorman proposing that the HPIs would keep occurring or that production could continue?

THE CHAIRPERSON: I thought she was referring to the HPIs, but what was it, Ms O'Gorman?

MS O'GORMAN: Q. My question was geared to the inspectorate's satisfaction for the HPIs to continue occurring. I asked that question because as of 7 April we're up to 10 HPIs, but, as we know, there were more to come. My question was whether it was the inspectorate's attitude then and now that so long as there was a specific immediate cause for each HPI which was notified to you, and so long as you considered that each cause had a simple technological fix, it wasn't necessary for the inspectorate to intervene?
A. I didn't believe it was necessary for us to intervene at that point on the basis of the types of exceedances that we'd seen and had been notified to us. My expectation was that we would not see further exceedances as a result of issues with maintenance of the goaf sleds; that the mine has had clearly demonstrated to them the importance of making sure that their goaf drainage system and sleds operate appropriately, to ensure that they did what they

were supposed to do and maintained extraction of gas from the goaf.

Similarly with the exceedances where the methane reported around via C heading, again it's relatively simple mining practice to ensure that those devices do their job. I would suggest that had those - particularly that variety of exceedance continued to occur, we would have, or I would have certainly raised it with the mine when I was intending to visit for an inspection in early May, that they needed to either re-educate their workforce and supervisors, because they can't continue to have basic - have exceedances because of basic mining practice, poor basic mining practices.

I mean, they've already told us that they are going to have a challenge managing the gas in longwall 104 because of the amount of drainage that they did or did not do, which left them very few options in terms of if they want to mine it and not have exceedances, which means to me that they have to be on top of their game with respect to everything from the very simple erection of a brattice stopping, to the maintenance of their goaf sleds, to the setting of the appropriate - putting the appropriate settings into their system on the face so that the shearer stops where it's supposed to stop, that their calculations are appropriate so that when they slow the shearer down, it will slow the shearer down before the methane will exceed, and so on.

They're the more technological things, and they haven't particularly been exposed as a weakness, if you like, other than the very first one, but certainly the other ones, to me, were basic mining practice. Again, if they continued, yes, there would be a reaction from the inspectorate.

Q. When you say "if they had continued", you're referring very specifically to repeated HPIs due to the same specific cause?
A. Well, causes that could be related, if you like. I mean, poor mining practice is not just poor erection of brattice stoppings. There are other things that they can do that they shouldn't do.

Q. All right. Let's come back to these form 5As that you were being provided with on 15 April, then. We've seen

already by going through them that by 15 April the mine had identified and notified the inspectorate about the underlying problem of the lack of P seam drainage?
A. Yes.

Q. And had identified on each of the form 5As the same preventative actions that were going to be undertaken to stop them occurring?
A. Yes.

Q. The first one seems like it is an action which could practically not be completed in respect of 104 because it relates to the design and completion of future longwalls, doesn't it?
A. As I see it, yes. A decision by the mine to do something in longwall 104 - it doesn't expressly say that they will or won't in there. That would be a decision for them, but it's not - as I read it, it's not my expectation that they intended to go and develop drainage in the P seam in 104.

Q. So you understood that's a preventative action for future longwalls?
A. For future, yes.

Q. Which of the following preventative actions notified to the inspectorate on 15 April were going to be suitable for preventing further methane exceedances on longwall 104?
A. Well, in terms of the goaf sleds, they make the comment that - "modifications to the goaf skid flame arrestors", so that they can maintain them while they remain in service, so specifically to that reduction in flow or in fact cessation of flow from the goaf holes.

Q. Yes.
A. And the final sentence, being the, "Amend the gas drainage TARP to add guidance for high flow goaf hole maintenance practices", which is essentially, as I understand it, an intention to instruct the people who do maintain the goaf sleds on the surface on when and when not to interfere with the goaf sleds.

Q. So both of those proposed preventative actions that might have prevented HPIs on longwall 104, to your understanding, related to goaf sleds?
A. Yes, both of those.

Q. Do you know whether the final preventative action was implemented during the life of longwall 104?
A. As in all of that?

Q. The final one, the amending of the gas drainage TARP. To your knowledge, was that done?
A. It's not to my knowledge. I haven't checked that.

Q. Having received those form 5As on 15 April, did the inspectorate contact the mine, do you know, to discuss these preventative actions or anything else that the mine was going to do to prevent further HPIs on longwall 104?
A. Not that I'm aware of, no.

Q. Do you know whether you or anyone else perused these form 5As to see if the inspectorate was satisfied with the analysis undertaken by the mine as to their seven HPIs in March?
A. I know that in the 5A for the first HPI where it informs us that the - I'll reference it, if you don't mind. Where it determines that the exceedance was most likely due to goaf - the shearer's proximity to the tailgate causing scouring of the goaf, I recall that, becoming aware of that.

Q. Sorry, Mr Smith, we might be at cross-purposes. My question was whether you know whether you or anybody else, on or after 15 April, reviewed these form 5As to see if the inspectorate was satisfied that the mine had undertaken an appropriate analysis of its March HPIs?
A. Not that I'm aware of, no. I didn't.

Q. Should the inspectorate have done that activity?
A. It's certainly an activity we should do, yes.

Q. Can I take you to another document. It's RSH.002.041.0001. This documents relates, does it not, to an email received by your office on 17 April 2020 from the mine?
A. That's right.

Q. In fact, what we can see there towards the top of the document is the forwarding on by Geoff Nugent to you and others --
A. Yes.

Q. -- the email which had in fact come from Mr Niehaus to

Mr Nugent?
A. Yes.

Q. If we scroll down a little, we can see the email that Mr Niehaus in fact sent to Mr Nugent and Mr Brownett starting at the bottom of page 1?
A. Yes.

Q. If we scroll down a little further, please, Mr Operator, essentially, the purpose of this email was to inform the inspectorate, was it not, that the mine was going to be mining through a fault in the near future and that it may be having to deal with significant fall material on the face and that it wanted an exemption, to use that word, from the inspectorate to be able to operate the AFC and the shearer to remove fall material even when the inbye sensor was recording more than 2 per cent methane?
A. I'm not sure that I would put it - phrase it exactly like that. As I - as Inspector Nugent and I spoke about this and then as I read the email, what I take from the email is that, "Yes, we are mining across - we are mining through a fault. That fault will make its way out through the tailgate. We have done everything that we believe we can do to control the structures in the tailgate. However, on previous occasions, to wit longwall 103, we had an experience where that work that we did was insufficient and consequently we found ourselves in the situation at the mine where the tailgate roadway itself had strata failure", which blocks the road, which restricts the ventilation flow, and they were able to, under the previous regulation, use the shearer to clear the stone - run the AFC, operate the shearer, provided the gas content around the shearer was less than 2.5 per cent.

That the change in regulation which had been required - the change to compliance with the regulation that had been required of the mine back on 8 April put them, in his mind, exposed to the possibility that they would not be able to operate the shearer to clear material from the tailgate, were the same thing to happen, because if it went over 2 per cent he would not be able to, in the tailgate roadway, operate the shearer and/or the AFC.

So I saw it as a hypothetical, "This is a hypothetical situation that may happen to us, and if it does happen to us, we are not happy with the possible solutions and we

think the best way forward is to see if we can get the ability to operate the shearer and the AFC between 2 and 2.5 per cent."

Inspector Nugent had made it clear both verbally and in writing that, as they know about the potential for the hazard, their function, as the operator and management of the mine is to do adequate risk assessments and put appropriate measures in place so that they have got an acceptable level of risk when they mine through that fault and that we don't have the capacity to provide exemptions from regulations.

Q. Did you have any discussions with anyone at the mine about their concerns about mining through the fault and what that might mean for the mine's ability to clear fall material, whether along the face or in the tailgate?
A. Yes, I did. Prior to that, I had some discussions with others in the inspectorate, and I was informed that a very similar hypothetical had been expressed in 2019 when, at I think a mining managers association meeting that was being held and the proposed change in the regulation was being presented, if you like, to mine managers, that a very similar hypothetical was expressed, that the 243A regulation would prevent this ability. The response at that particular meeting was that it's up to the mine management to ensure that the tailgate does not fall down; that is their responsibility.

What I'd also add is that while these are some options as identified here, options 1 to 4, the other three options, to my mind they are not the only options available to the mine. They are some options, but there are other options that they have available to them.

Q. And did you personally have any conversations with anyone at the mine about those options?
A. Well, I rang Mr Niehaus and essentially my discussion with him was that they have the responsibility for assessing the risk and maintaining an acceptable level of risk, that we don't have the opportunity to provide exemptions from regulations, that it was a foreseeable risk. In his email he tells us this happened in longwall 103, therefore it's already happened at the mine, therefore it's a foreseeable risk at the mine. They need to ensure that they risk-assess it appropriately and deal with it appropriately in any of their future workings.

MS O'GORMAN: Mr Martin, there are still some more HPIs to be gone through. I'm not sure what time the Board intended to sit to this afternoon.

THE CHAIRPERSON: I was thinking 4.30, but I can be convinced otherwise. Whatever is convenient.

MS O'GORMAN: We may as well keep going, if that's convenient. Thank you.

THE CHAIRPERSON: All right.

MS O'GORMAN: Q. Mr Smith, I want to take you now to the next of the HPIs, and these occurred in a batch together, of four, on 21 April 2020.
A. Yes.

Q. Mr Brennan was notified of HPIs 11, 12 and 13 in two separate calls on 21 April 2020, wasn't he?
A. Yes.

Q. And they had in fact occurred on the following times - 12.58am, 1.54am and 1.06pm?
A. Yes, I believe so, yes.

Q. If we could go to document AAMC.001.009.0327, please, there's form 1A for the first of those three exceedances. Can you see that?
A. I can.

Q. Perhaps if we go down to the bottom of the page to see the explanation for that incident, we can see that the shearer was at shield 118 heading into the tailgate on this occasion?
A. Yes.

Q. Methane peaked at 3.08 per cent at 1.04am. Can you see that?
A. Yes.

Q. And there was a detection on the 400 metre sensor, the inbye sensor, of a peak of 1.48 per cent at 1.08?
A. That's right. Yes.

Q. If you go over the page to the bullet points, we can see the sensors involved in that exceedance?

A. Yes.

Q. It was the section 243A sensor, as described there --
A. Yes.

Q. -- which detected the exceedance?
A. Yes.

Q. Value, as we saw from the earlier page, was 3.08 per cent and the exceedance lasted 9 minutes?
A. Yes.

Q. If we go to the form 1A for the next HPI, the document is AAMC.001.009.0325. This one occurred about an hour after the first?
A. That's right.

Q. If you scroll down a little, we can see there that after the gas had dropped and steadied, the shearer was repowered and commenced cutting, and then the same sensor detected another exceedance at 1.54am?
A. Yes.

Q. There's reference there to movement of the butchers curtain?
A. Yes.

Q. And the brattice wing being installed after the first event to limit the impact of the goaf on the sensor?
A. Yes.

Q. If we go over the page, we can see the bullet points there setting out the precise details of that exceedance, and it simply confirms that the exceedance was on the section 243A sensor on shield 149?
A. Yes, yes.

Q. Finally in respect of the HPIs which were notified to your office on 21 April, we have document AAMC.001.009.0323. If we go perhaps straight over to the next page, to the bullet points, we can see that again it was the section 243A sensor which recorded the exceedance?
A. Yes.

Q. But on this occasion, the peak value was 5.04 per cent?
A. Yes.

Q. And that that duration lasted 10 minutes?
A. Yes.

Q. That's a significant HPI to be notified about, isn't it, Mr Smith?
A. Yes, yes.

Q. An exceedance --
A. Lower explosive limit of the gas.

Q. Yes, an exceedance reaching 5.04 per cent means that the lower explosive limit had been reached on that occasion?
A. Yes.

Q. And that the methane exceeded 2.5 per cent for 10 minutes on that occasion?
A. Yes.

Q. Did that or should that HPI have set off any alarm bells in your office, Mr Smith?
A. That exceedance - an exceedance that reaches that level does set off alarms, yes.

Q. So having set off the alarms, what did your office do?
A. So what we do is, being aware that the exceedance is on the canopy sensor, what else - what other information do we have? We have a duration for the exceedance and we have other sensors. Now, the other sensors - so we've got the 243A sensor, which is out in the tailgate, and it has the responsibility of cutting power at 2 per cent to the shearer cutters and to the AFC, and it's reading under 1.5 per cent at the time --

Q. Sorry, if I can stop you there, what that means is that because there hadn't been an exceedance further down at the inbye sensor, as it's been described, sufficient to cut off the power - is that what you're saying, that there hadn't been an exceedance there sufficient to --
A. That's the first place I had a look, yes. What's happened there? Okay? Has there been - and what else has happened? The shearer has detectors on it. The tailgate drive has detectors on it. They're designed to pick up general body and they're also designed to cut the power to tailgate drives, to the shearer itself, cut the haulage and turn the cutters off. So there are numerous detectors

available to us for determining the scale of the exceedance, if you like.

So when I look at the exceedance in the tailgate roadway, that tells me that even though they've got 5 per cent at the canopy, they don't have 5 per cent in an enormous volume.

Now, in a longwall, in my experience on longwalls, what's known as the goaf stream, which ebbs and flows out of the goaf into the tailgate roadway and away for dilution, is quite often in excess of 5 per cent, in my experience, so --

Q. Maybe if I could just bring you back to my initial question, my question was whether or not an exceedance at a peak of 5.04 per cent but for a duration of 10 minutes above 2.5 per cent in the tailgate roadway ought to have set off alarm bells, and I think you said yes, it does?
A. My answer to that is yes.

Q. My question is, what, if anything, did the inspectorate do in response to those alarm bells?
A. Went further with the - went further into the information provided by the mine with regard to it in terms of --

Q. I'm sorry, I don't mean to be cutting you off. I'm trying to see if I understand. Is your answer that what happened was that you or another inspector turned your mind to what other sensors were picking up what readings on that occasion?
A. Yes, yes. Sorry, yes.

Q. All right. After having done that, what did the inspectorate do in response to notification that there had been methane within the explosive range at the mine for a period of time on that day?
A. At or about that time, I'd been requested by the chief inspector to attend the mine, more in relation to the 243A sensor and the directives that I'd issued to three mines at that time. So there was already an intervention planned. So, to my mind, I'm going to the mine in the next few weeks, anyway, so this will certainly be something I'll be talking to the mine about.

Q. And is that the extent of the action that was taken by

the inspectorate?
A. At this stage - at that stage, yes.

Q. To be quite clear, we're talking about a planned inspection that was going to occur at the mine on 13 or 14 May?
A. At that - yes, that's right.

Q. More than a week or so after 6 May?
A. A couple of weeks away. Yes, a few weeks. The following week.

Q. After 6 May?
A. Yes, the following week.

Q. The last notification that your office received was on the next day, 22 April, wasn't it? HPI number 14, or number 27 in your statement, was notified to Inspector Brennan on 22 April and it related to an exceedance that occurred at 11.06pm the evening before. Do you recall that? I can take you perhaps to --
A. That was the 5 per cent one.

Q. Oh, that was that one?
A. That was the 5 per cent one.

MS HOLLIDAY: If I could just assist, that was the final form 1A. It's on the screen presently.

THE WITNESS: There was one --

MS O'GORMAN: Q. Previously?
A. What is the third exceedance was at lunchtime or 1pm the previous shift.

Q. You're quite right. I'm sorry, I've confused you. I took you to the fourth one but third in time. For completeness, if we could just go to the third one, then, document AAMC.001.009.0323. You can see here the form 1A for the third of the exceedances that occurred on 21 April?
A. Yes.

Q. Perhaps if we go straight over to page 2 and to the bullet points, we can see that this exceedance, like the others, was detected on the section 243A sensor?
A. Yes.

Q. The peak value detected was 2.66 per cent?
A. Yes.

Q. And the duration over 2.5 per cent was less than a minute?
A. Yes.

Q. To be clear, that exceedance occurred prior to the one involving the reading of 5.04 per cent?
A. That's right. That's right. In the group of four exceedances, the first one's over 3, then there's another one an hour or so later, when, to my way of thinking, they've not adequately set up the local ventilation at the tailgate to manage the shearer coming in, and they've got another one for a short duration. Twelve hours later, which is after lunch, which is often a period when the barometer starts to drop as well, they've had the third assistance for a short duration, and then that night the very high exceedance.

Q. Do I take it from your answer there that you were satisfied that on this occasion, the precise or immediate cause of these four exceedances was related to the ventilation in or around shield 149?
A. Yes.

Q. And you could put the issue down to the ventilation at or around shield 149?
A. My belief was that it's the management of the goaf stream, how the mine is managing the goaf stream and its opportunities to come on to the face or drift across to the face. It also comes down to the positioning of the shields, where is the shield itself and where is the canopy tip itself.

I must say that despite having to direct the mine to put the 243A sensor in the correct location, I was pleased, personally pleased, that they continue to maintain the sensor in the canopy tip simply for the purpose of - it provides them as the mine, but us as industry, information that previously is limited to very sporadic readings from inspections by a person. And having a device there collecting information full time I think will provide very useful information for industry to understand, one, the importance of the 243A sensor and the reason it was introduced to industry, but also to get some understanding of how important it is to manage their - have a good

understanding of how they manage the local ventilation controls at the tailgate.

Prior to this, the only time we knew how much gas was there was if it either tripped the tailgate drive or if it tripped the shearer, if the shearer came in, or if the ERZC with their detector - happened to put their detector in an appropriate location. So I'm really quite pleased that the mines have maintained that sensor.

MS O'GORMAN: I understand. Thank you, Mr Smith.

THE CHAIRPERSON: Is that a convenient time?

MS O'GORMAN: Thank you, Mr Martin.

THE CHAIRPERSON: All right, 10 o'clock in the morning. Thank you.

AT 4.34PM THE BOARD OF INQUIRY WAS ADJOURNED TO WEDNESDAY, 10 MARCH 2021 AT 10AM

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