



Royal Commission on the Pike River Coal Mine Tragedy
Te Komihana a te Karauna mōte Parekura Ana Waro o te Awa o Pike

UNDER THE COMMISSIONS OF INQUIRY ACT 1908

IN THE MATTER OF THE ROYAL COMMISSION ON THE PIKE RIVER COAL MINE TRAGEDY

Before: The Honourable Justice G K Panckhurst
Judge of the High Court of New Zealand
Commissioner D R Henry
Commissioner S L Bell
Commissioner for Mine Safety and Health, Queensland

Appearances: K Beaton, S Mount and J Wilding as Counsel Assisting
S Moore SC, K Anderson and K Lummis for the New Zealand Police
N Davidson QC, R Raymond and J Mills for the Families of the Deceased
S Shortall, D MacKenzie, R Schmidt-McCleave and P Radich for certain managers, directors and officers of Pike River Coal Limited (in receivership)
C Stevens and A Holloway for Solid Energy New Zealand
K McDonald QC, C Mander, A Williams and A Boadita-Cormican for the Department of Labour, Department of Conservation, Ministry of Economic Development and Ministry for the Environment
G Nicholson and S Stead for McConnell Dowell Constructors
G Gallaway, J Forsey and E Whiteside for NZ Mines Rescue Service
N Hampton QC and R Anderson for Amalgamated Engineering, Printing and Manufacturing Union Inc
J Haigh QC and B Smith for Douglas White
J Rapley for Neville Rockhouse
T Stephens and N Blomfield for New Zealand Oil and Gas
P Mabey QC for Pieter van Rooyen

**TRANSCRIPT OF PHASE THREE HEARING
HELD ON 8 FEBRUARY 2012 AT GREYMOUTH**

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COMMISSION RESUMES ON WEDNESDAY 8 FEBRUARY 2012 AT 10.00 AM**THE COMMISSION:**

5 Mr Mabey, it has not been our practice to call for the announcement of appearances at the start of each set of hearings because pretty much in the main everyone is known to us and we have a fairly consistent turn out, but this is your first appearance and we know your representing Mr van Rooyen, who is to give evidence as Mr Wilding has said next week.

10 MR MABEY:

That's correct, Your Honour and I announce my appearance as a late coming.

THE COMMISSION:

15 Ms McDonald, you are leading the evidence of Mr Murray?

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MS MCDONALD:

I am sir, I just, if I could just indicate that Mr Mander and I will be calling the three witnesses that will start off this session. I will lead Mr Murray who, as Mr Wilding has indicated, has been the head of the department's investigation
20 into the explosion and he will provide an overview of the investigation. The two experts that will follow him will be able to provide detailed information on the technical aspects. Mr Mander will lead Mr Reece's evidence and I will then lead Mr Reczek's evidence. Both of those experts, the Commission will appreciate, have filed very detailed briefs of evidence and in many respects
25 those briefs are very technical. Our intention is to have both of those experts do a presentation by way of their evidence in chief which we hope will assist making aspects of their evidence more accessible and then of course they will be available to answer any questions, so Mr Murray is the first witness.

MS MCDONALD CALLS**BRETT MURRAY (SWORN)**

5 Q. Mr Murray, can you confirm that your name is Brett Murray, you're from Wellington and you are the general manager National Services and Support Labour Group with the Department of Labour?

A. Yes I do.

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Q. You have filed a brief of evidence for this session which I think is dated the 31st of January 2012?

10 A. That's correct.

Q. Got a copy of that with you?

A. Yes I do.

15 Q. And just for the record, could I also get you to confirm that you have previously filed a brief or a statement for the Inquiry for Phase Two and that statement is dated, I think, the 14th of July 2011?

A. Yes, that's correct.

Q. You were the - or are the head of the investigation for the Department of Labour into the Pike River explosion?

A. Yes I am.

20 Q. And the purpose of your evidence today is to provide an overview of that investigation, but you're not, of course, going to comment on the police investigation. Is that the position?

A. Yes that's my position.

Q. If you could just turn to your statement now please?

25 **WITNESS REFERRED TO STATEMENT**

30 Q. By way of background and context, could you just explain the role that the Department of Labour have in an investigation such as this, how you go about what you do, and your statutory obligations. It's really the matters you could summarise covered in paragraphs 6 to 10 of your brief of evidence?

A. Yes. "The department's health and safety inspectors are empowered under the provisions of section 30 of the Health and Safety in Employment Act to carry out investigations into workplace accidents,

and essentially the inspectors are looking to establish what happened in the accident resulting, whether any breaches of the Health and Safety Act or related regulations have occurred, and also to determine whether improvements to prevent recurrences of what happened should be required or recommended. In light of the investigation findings, once an investigation has been completed inspectors may also take appropriate enforcement action and obviously that includes prosecution under the Health and Safety Act, but could also include a number of other enforcement sanctions. So pursuant to the powers under the Act, the department's inspectors, which is essentially a team led by myself, and I conducted a comprehensive investigation of the events and occurrences and circumstances that led to the explosion at the Pike River Mine. We considered whether any breaches occurred under the HSE Act or relevant mining regulations, and in this case it's the Health and Safety in Employment (Mining Administration) Regulations 1996, and the Health and Safety in Employment (Mining – Underground) Regulations 1999 are the two regulations that we're considering. Section 54B of the Act requires an information in respect of an offence under the Act to be laid within six months and that's after the earlier of either (a) the date when the incident, situation or set of circumstances to which the offence relates firstly became known to an inspector; or (b) the date when the incident, situation, and set of circumstances to which the offence relates should have reasonably become known to the inspector. Section 54D also provides that the District Court may, on application, extend the time for laying an information, and in the case of this investigation it became quite apparent earlier on to me and the team due to its nature, its size and complexity that we would need to ask for such an extension and that was duly sought from the District Court and heard in the District Court in Greymouth on the 2nd of May 2011 and the department was granted an extension of time from the 19th of May for the laying of information, six months."

Q. Could you outline please the purpose of the investigation or the primary purposes of the investigation?

5 A. Yes. The primary purposes are essentially threefold. One was to consider the adequacy of precautions required under the HSE Act taken by the duty-holders, and in this case the primary duty-holders were obviously Pike River Coal Limited, its directors, staff and also the contractors who were employed by Pike River Coal who also have duties under the Act for their own staff obviously. Also to establish, if possible, the circumstances, the immediate causes and, if possible, the root causes of the explosion on the 19th of November 2010 and also to consider what could be done to prevent a recurrence of such an incident.

10 Q. Now, from paragraph 12 in your brief you talk about the methodology followed for the investigation. I think it might be – if you could read through that, work your way through those sections and summarise them where you feel that might be of more assistance?

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20 A. On the, on the 21st of November the investigation team arrived in Greymouth to commence scoping and planning of the investigation. On the 29th of November 2010, the department's full team arrived in Greymouth and commenced the investigation. It was very clear early on, on my arrival in Greymouth on the weekend after the explosion just given the size and scope of what lay ahead that we would require a substantive team to investigate the investigation as thorough as it needed to me. The police had also initiated a full CIB-led investigation into the accident and they were actually onsite shortly after the incident occurred so obviously Gary Knowles' team were looking after the operational side of things and a police team led by Detective Superintendent Peter Read was on ground very early. I had several meetings with Peter Read to establish protocols around a parallel investigation and this involved largely sharing of information from witnesses, the sharing of experts and also the sharing of data collected from the company and a lot of that was done to avoid duplication and additional stress on witnesses obviously had been interviewed twice by separate organisations. So the department established an investigation

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team comprised of myself as head of investigation, an investigation manager who is Mr Keith Stewart, eight full-time investigators, a file and exhibits manager, an analyst and an administration support person. There were also a number of other staff obviously dealing with such areas as official information requests, legal matters and certainly in the first several weeks we had staff on the ground also as in family liaison working through with other agencies around the social aspects of the incident. The investigation is the largest of its type that's ever been undertaken by the department and it faced a number of significant and unusual, in the context of HFC investigations anyway challenges. I'll just detail these for you. Firstly, there was the lack of access to the mine itself, into the scene, and that meant that the investigation had to be very broad in its scope in order to reconstruct a detailed picture of the scene from both documentary and testamentary evidence. The inability to do a scene examination also resulted in difficulty in establishing, certainly with certainty, direct causation of the explosion and it resulted in additional expert analysis to adequately consider a number of possible scenarios. I guess the upside of that was it did allow us to consider a broad range of the company systems in depth and those of the contractors which may have been a bit more narrowly focused had we access to a scene. Accidents obviously typically arise from a number of complex interactions and a number of factors. It was necessary to examine a significant amount of information and specialist technical data relating to the operation of the mine. Over 15 gigabytes of requested information was received from Pike River Coal Limited and 276 DVD recorded witness interviews were carried out and that resulted in approximately 150 megabytes of typed transcripts. Just to put that in context, a lot of these interviews were up to three hours long and certainly in the early phases of the investigation the team was pretty much working around the clock and the interviews were carried out with a Department of Labour investigator and a police investigator, recorded on DVD and the result in three hour transcript transcribed, quite often is around 250/300 pages each interview. Information was also obtained

from a copy of the Pike River computer system made by the police so that was the company's main server. That was requested by police very early on and at a meeting that I attended and that's on the Pike River's legal counsel and the police seized that. There was some difficulty in
5 accessing that information early on, hence we began to request specific information. At that stage obviously we were working to a six month timeframe, we hadn't applied for the extension and I felt it was necessary to essentially get on with our investigation, so we requested a significant amount of data directly from Pike River which was quite
10 targeted at our investigation while the police worked through accessing of the company's hard drives.

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A. The technical information obviously was obtained to support expert analysis and specialists were engaged to carry out plant and equipment
15 examinations. They were in addition to our core group of experts, also some physical evidence such as coke-like material that, a gas sensor and associated equipment from the vent shaft was also examined. A number of witnesses resided in Australia and it was necessary to travel there to interview them and several witnesses were re-interviewed and
20 obviously without having a scene early on it was very much a case, certainly around the witness interviews, of building a picture as we go and that picture grew the more people we interviewed and there was a necessity to go back and clarify a certain number of aspects with various people. A number of contractors were engaged at the mine,
25 each with their own employees. As I've mentioned the presence of contractors effectively meant that an additional eight separate investigations were carried out in addition to the main investigation into Pike River. Another complexity was the post event receivership of Pike River Coal. This resulted in the need to establish a new relationship
30 with not only the receivers but also new legal counsel who came onto to the scene once that happened. It also meant there was an uncertainty around, for a period, on who had authority to speak or act for Pike River Coal Limited, which was quite critical to us. In addition the receivership

also meant that a substantial number of staff at the company were laid off and that resulted in additional difficulty, particularly in terms of time delays and gathering necessary information essentially because there was no one at Pike River for several weeks to actually compile the information required. So I hasten to add it wasn't a delay on the company's part, it was purely the circumstances that they were in. The availability of experts was another significant issue. Obviously there's only a small pool. The mining industry itself is quite small throughout Australasia relatively speaking so there is a small pool of relevant expertise within Australasia. I was very keen to engage experts early and obviously on an investigation this size the earlier you engage experts the better, particularly as an investigating agency before they are snapped up by others and we worked quite hard to engage experts. A number of experts that we looked at engaging, some had conflicts of interest obviously, and we sought advice on experts from colleagues and particularly the Queensland Mining Authority and in fact Mr Reece who we engaged as our overall expert was recommended to us by the Chief Inspector of Mines in Queensland.

Q. Just if I pause you there, you've identified through that commentary a number of limitations or challenges. I think probably for the investigation can you comment on whether you believe those challenges were overcome during the course of the investigation and what perhaps was the primary challenge?

A. I guess the primary challenge early on in not having the scene was obviously the difficulty in building a picture of what happened on the day the mine – a lot of the investigation focused on building a very detailed picture of that so if we look at the very early days of the investigation which we pretty much went straight into interviewing staff at the mine, staff from previous shifts, we focused on the mining staff first to try and quickly build up a picture of what the conditions were in the mine immediately preceding the event and obviously we were going in blind to that because like any investigation you don't know what you don't know initially so we were relying on a number of questions that we

prepared to try and build us that picture and that was a challenge because obviously you interview one person and someone, the next person, tells you something slightly different or expands on some areas so there was a constant refreshing of questions and as the picture develops it becomes a lot more detailed in terms of the interviews. I believe that challenge was overcome quite well. We went back and re-interviewed other people and we also put, as our knowledge broadened, more detailed questions to the people that we subsequently interviewed. The receivership issue was an issue, it was more of an issue around time rather than material. As I've said, it wasn't an issue with Pike refusing to supply information, it was a logistical matter. The receivers re-employed several people from the company to do that and then the flow of information obviously improved but it did delay us in being able to obviously analyse that and feed it back to our experts.

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A. The availability of the experts was a concern early on although we did get David Reece on board very early. It took us a while to find a suitable electrical expert so hence the investigation into the electrical side of things was commenced at a later date and some of the other Nelsons - I don't know that was a particular challenge. It meant it was a little bit later in beginning to formulate a hypothesis around electrical issues at the mine but obviously there was plenty of other work that we had to go through anyway so.

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Q. Paragraph 17?

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A. So, just in terms of the investigation we had 13 full-time members of the investigation team working on the investigation for a period of nine months and then the team gradually reduced to having four full-time members. The bulk of that early work was conducted in Greymouth and we had an office here in Greymouth. It's estimated that at least 36,000 hours had been spent on the investigation so far, not including time associated with work with the department's head office and legal advice and assistance to the team, which has been a large part of my role, certainly in the last several months.

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Q. Mr Murray, from an evidential point of view would obtaining access to the drift be of benefit to the investigation team?

5 A. Yes and Mr Reece could probably touch on this on Monday, the issue of electrical ignition sources, particularly the focus around the VSD drives, the variable speed drives is of quite some significance to the investigation and we are keen to have a look at the VSDs, near pit bottom stone so we can get access to the drift. Obviously we don't know what we'll find or whether that will contribute anything to the investigation but certainly something that we would like to look at. In terms of other evidence within the drift it's largely a matter of seeing what's in there when we get in there I think, as to its, you know, as to whether it would be of value forensically given the subsequent explosions.

10 Q. And if more information did come to light is that material or information that the investigation team would consider afresh?

15 A. Well, certainly and in fact in our investigation for particularly around the electrical area we've indicated that we are still working through several areas in that regard.

20 Q. All right, now I'll just bring you back then to your brief, paragraph 18 and following where you talk about the expert evidence, if you can just summarise those matters?

25 A. Just in relation to the expert evidence, so in order to assist with determining the causes of the explosion, its assessment of the adequacy of the precautions taken at Pike River to ensure the safety of people working there and to determine what could be done to prevent a reoccurrence the department engaged a number of experts. The department sought advice from numerous sources including the Queensland Chief Mines Inspector, as to what kind of expertise was necessary and who would have the necessary qualifications and experience for the roles. David Reece, a mine safety expert from 30 Australia was the first expert engaged by the department. His role was to provide overall advice on mine safety and co-ordinate and organise the input of other experts into the evaluation of the safety systems at

Pike River and to compile a joint final report. That was a decision made quite consciously by myself and Keith Stewart, that we wanted an overarching expert who could pull the threads together of other experts and provide a – we felt that it would be more of use to the Commission and our investigation that we had an overall, one person compiling a report rather than a report written by committee, although obviously the report written by Mr Reece draws directly from the reports from the other experts. So, expert advice and analysis was provided by this core group of experts, co-ordinated by Mr Reece. It comprised expertise in geology and geotechnical engineering, ventilation engineering, electrical engineering, chemistry and gas analysis around gas and coal dust explosions and mining engineering and management, the latter supplied by Mr Reece himself. The core group of experts consisted of David Reece, who's a mine safety expert, principle consultant of the Safety Managers Limited, Professor David Cliff, who is a leading explosion expert in Australasia and director of the University of Queensland's Minerals Industry Safety and Health Centre. Tim Harvey, an expert in ventilation engineering and gas drainage analysis and contracted mining engineer. Tony Reczek, expert in electrical engineering in mines, who is a senior consultant with ARA Risk Consultants and also Doctor David Bell, an expert in geology and geotechnical engineering. Mr Bell is the senior lecturer in engineering and mining geology at the University of Canterbury. In addition to that I guess this core group of experts, as I've earlier alluded to, we also engaged specialists who advise us on specific mine systems and machinery and plant. They included Mr Colin Ward who's an expert on frictional ignition, Energy New Zealand Limited, to identify electrical systems and operation at the mine and also to assess compressed air systems and the gas monitoring systems and they worked quite closely with Mr Reczek throughout the course of the investigation as it progressed, particularly the latter end of the investigation.

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5 A. BMT WBM engineering and environmental consultants who carried out explosion modelling at the mine around the methane. JLE Electrical. We use those to examine all the remaining cap lamps that were left at the mine. SafeMine Engineering. SafeMine examined the diesel equipment that was left above ground. That diesel equipment that was above ground had also been used in the mine and some of it is as closely as the previous shift and it was machinery that was regularly used underground. We thought we'd do that obviously to give us an indication of, potential indication anyway of the state of machinery underground as well. And Nautitech Mining Systems to examine the gas monitors on the diesel equipment above ground. Draeger to examine the hand-held gas monitors above ground.

10 Q. I don't think you need to read paragraph 23, but perhaps if you just confirm that the experts were provided with all the relevant information, that you obtained reports, plans and the like and you've set those matters out at paragraph 23 haven't you?

15 A. Yes, that's correct.

Q. Mr Reece compiled a joint report in October 2011 setting out the experts' findings and conclusions. Is that right?

20 A. Yes, that's correct.

Q. Now, paragraph 25?

25 A. So this is relating to the focus areas for the departmental's investigation. The investigation focused on the systems and infrastructure at Pike River Coal Ltd and also the individual contractors at the mine. As a result of initial information gathering and with the advice and assistance of experts, and that's quite an iterative process as we work through stuff. We were in constant engagement with our team of experts. Mr Reece and others visited New Zealand on a regular basis and we spent several sessions with them going over evidence and looking at what additional evidence in areas that we needed to look at over the course of the investigation. But the number of areas of focus for the investigation included the new underground main fan, which was considered unusual in its placement and had apparently encountered

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problems during its commissioning phase. The mine's electrical systems, including their stability and loading, and the fact it was around a potential source of ignition from those systems. The hydro-panel. This was a potential source of a large quantity of methane and had recently shifted to a 24-hour production phase. Methane concentrations and other coal characteristics at the mine, including how methane was monitored and how methane was managed generally by Pike River. Ventilation systems at the mine, including the quality and design of ventilation control devices. Contractor management systems at the mine and the extent to which they were understood and implemented by mine management and contractors. Risk management. That included risk assessment and other management tools at the mine, the scope of such assessments, their adequacy and the extent to which they were implemented. Maintenance systems at the mine for plant and equipment, the adequacy and scope of such systems and the extent to which they were implemented. Gas drainage systems and in-seam drilling at the mine, and emergency management systems, including the adequacy of the ventilation shaft as a potential second egress, smoke lines, evacuation training exercises, the fresh air base/changeover station, explosion mitigation systems and also the auditing of emergency management systems. We also considered a number of other potential factors and they included the number of management changes that occurred at the mine site, apparently optimistic production forecasts, geological challenges faced in the mine, shotfiring around the goaf boundary, compressed air use, the levels of experience of the workforce, and the level of technical experience of certain managers, and the team prepared a detailed report (the investigation report) which we are obviously referring to at the moment, summarising the investigation's findings, and that report incorporated the findings from the expert group and other specialists.

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Q. Coming now to the outcome of the investigation. If you could summarise that please?

A. Yes. So as a result of its investigation, on 10 November 2011, the department laid the following charges: Pike River Coal Limited (in receivership) was charged with four offences of failing to take all practicable steps to ensure the safety of its employees; five offences of failing to take all practicable steps to ensure the safety of its contractors, subcontractors and their employees; and one offence of failing to take all practicable steps to ensure that no action or inaction of its employees harmed another person. VLI Drilling Pty Limited (Valley Longwall) was charged with one offence of failing to take all practicable steps to ensure the safety of its employees; one offence of failing to take all practicable steps to ensure the safety of contractors, subcontractors and their employees; and one offence of failing to take all practicable steps to ensure that no action or inaction of its employees harmed another person. Peter William Whittall was charged, as an officer of Pike River Coal Limited, with four offences of acquiescing or participating in the failures of Pike River Coal Limited as an employer; four offences of acquiescing or participating in the failures of Pike River Coal Limited as a principal; and four offences of failing to take all practicable steps to ensure that no action or inaction of his as an employee harmed another person. The investigation report itself was filed with the Royal Commission on the 22nd of November 2011.

THE COMMISSION ADDRESSES COUNSEL – APPLICATIONS FOR CROSS-EXAMINATION OF WITNESS – ALL GRANTED

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25 CROSS-EXAMINATION: MR DAVIDSON

Q. Good morning Mr Murray.

A. Morning.

Q. As I've indicated I just want to ask you about two broad areas, first of all regarding the process of the investigation to date and where it may go from here and the second area relates to what I see as within your realm. That is the reference in the report that we've read in the appendix to data and comment about what you were able to locate

within Pike River records about certain topics. So, I'll start obviously with the question, the process of investigation. There are several references to the compromise of the investigation by not being able to enter the scene of the mine whether that be the drift of the mine workings proper and during the course of the last year, and there were many discussions that counsel have had and I think partly with you informally. For the families there has been an attempt, of course, to get into the mine associated with the recovery but also in the belief that it would be essential to determining the cause of the explosion and subsequent explosions. And one of the comments that's come back about that has been that such would be desirable but not essential.

WITNESS REFERRED TO EVIDENCE OF MR REECE – PARAGRAPH 18

Q. Given that, there's a comment in Mr Reece's evidence it is paragraph 18, I'll just take you to it, that it's not possible to conclusively determine the causes of the explosion due to the significant volume of unknown facts that the scenarios postulated are based on a balance of probability rather than the strongly defensible facts. Does that reflect your own view as the head of this investigation?

A. Well, in the sense that it reflects the view of the experts that we've contracted to provide that advice, obviously in relation to the causation factors we've relied almost exclusively, well, very heavily anyway on circumstantial evidence including data modelling. With access to a scene obviously in every investigation, for an investigator access to the scene is of direct benefit in establishing causation but in this case we didn't have that so I think that comment by Mr Reece just expresses a natural reluctance to be too definitive when there are indeed a number of unknowns.

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Q. The reason I raise this is that in the investigation report which we've had access to on a restricted basis, at page 27, there is this reference and because this is not going onto the screen, Mr Murray, for the record this is at DOL3000.130010/27, that this is expressed as a conclusion. "It is highly likely that this explosion occurred because the accumulated

methane in the goaf was expelled by a large roof fall.” Then it goes on to contemplate the circumstances of that. I'm raising it because it falls within the balance of probabilities test, but it's put at the high likelihood end which of course is most relevant in this Commission's determination of cause.

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A. Yes.

Q. So is that a view expressed by you as head of investigation in the preparation of this investigation report?

A. Well, yes it is and based on the advice given to us by our expert panel.

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Q. Because we see this sort of forensic value of material that comes from the mine also in Mr Reece's evidence when he refers at paragraph 34, to the coking analysis of the coke particles that were expelled from the vent shaft on the 19th of November and that's a very small snippet of what was available from the mine and yet that piece of evidence has proved to be of consequence in this report in its conclusions because it's one of the central facets of concluding that this was a methane gas explosion and not a coal dust explosion?

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A. That's correct, primarily, yes.

Q. So that leaves us today in the position that, as you know, it's possible the drift will be reclaimed in the next weeks, or, one hopes not months, but short order, while this Commission still has its arena. What have you, as head of investigation, contemplated may emerge relevant to your report by recovery of the drift apart from the obvious point that men may be in the drift?

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A. Well, in terms of the investigation and, obviously this will be addressed directly by Mr Reczek on Monday that the main thing that we know will be in the drift is the VSDs down near pit bottom stone and Mr Reczek will be quite keen, from his perspective and obviously which would relate directly to the investigation, to examine those and the connections of those to any cabling that was still there. Obviously there may be some chemical forensic evidence in the drift, although how compromised that would be would be a better question for, perhaps, Dr Cliff to answer given the fact there's been a number of subsequent

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explosions and I think there's an element of the unknown in terms of what we find in the drift in terms of other concrete evidence which may prove of value or not to the investigation, but wouldn't be known until we actually entered the drift and obviously had a look.

5 Q. I take it that the first part of that answer in relation to Mr Reczek's consideration of the electrical equipment at pit bottom stone, relates to the whole, that part of the conclusion, the harmonic currents, have been responsible for the ignition source?

A. That's correct.

10 Q. So that, as you understand it, the investigation, as the report indicates of course has come to a conclusion regarding harmonic currents and their effect on the electrical installations but that concern, I take it from your last answer, extends not just to the, for example, the variable speed drive for the main fan but also the variable speed drive at pit bottom
15 stone?

A. That's correct. In fact all variable speed drives within the mine which Mr Reczek will give – it's a complex area obviously and Mr Reczek will be able to detail the thinking behind that.

20 Q. Yes. Well, I'll come back to that in a moment, but reverting to the question of getting into the mine, now, I take it that the investigation at least considered the possibility of trying to gain entry into the mine for itself, as part of its investigation?

A. For itself?

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25 Q. Well, as part of the investigation whatever the receivers may or may not be doing, the investigation would've wanted to get into the mine?

A. Ideally if we'd had access to the mine, it was of benefit, yes.

Q. But did you consider mounting your own entry to the mine, for example, into the drift?

30 A. No.

Q. So that was never considered nor costed?

A. Well, it wasn't a question of, it certainly wasn't a question of cost, it was a question of the mine is in the hands of the receivers, it's essentially

the receivers' mine and they had processes in place to recover the drift and in the department's position is that that was a function that they were undertaking and if it could be done safely then it would obviously be of benefit to the investigation if we could get in there, but the department's position also is the regulate, was that it needed to be done safely before any access could be gained to that.

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Q. But in essence the question of safe re-entry has been a matter within the hands of the receivers?

A. Yes.

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Q. Now, a further question about forensic enquiry emerges from the fact that the Commission has before it, and you have as an investigative team, quite a lot of evidence from the videos and the colour scans derived from the boreholes?

A. Yes.

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Q. And it's been put on behalf of the families at various meetings that there should have been, or should be consideration to a borehole being driven to an area where the goaf is expected to be located for the purpose of assessing your primary conclusion in the investigation report, so there has been a massive roof fall in the goaf. Has that been considered?

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A. It was considered and it was discussed with Mr Reece and the other experts. It was felt that it would add little value to the investigation conclusions and may not show anything of particular significance, given that we know there's been subsequent falls and there was discussion on what it would actually prove. We acted on that advice and obviously a borehole hasn't been driven into the goaf. I'm unsure what the logistical implications of drilling a borehole in that terrain, I'm not aware of the particular terrain that a rig would have to be set up on so I can't comment on that area.

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Q. Well, it's not a very sophisticated question I acknowledge Mr Murray, but we're facing a circumstance where it's possible and the families' hope become a probability that this mine would be re-entered in which case the theory advanced as a matter of forensic deduction, as you've described it, is going to be tested to the enth degree, isn't it?

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A. Yeah, and look as a head investigation I had no problem with that. We've conducted our investigation on the evidence available to us. We weren't able to access the mine, should in some time in the future full access to the mine be gained and some conclusions that we've come to
5 in the report are found to be not correct then obviously that's just the way it is but we can't act on assumptions at the moment that have no evidential basis obviously.

Q. Well, without putting anything on the screen, which I must not from this report, the way the likelihood is expressed diagrammatically in your
10 report is that there was a gas build up in the panel 1 goaf, there was a goaf fall in panel 1 pushing gas into the return, the goaf fall knocks over a stopping at three cross-cut one west, the gas in the return is diluted with the main intake return, explosive gas then comes in that mixed form in contact with electrical or metallic installations and induced harmonic
15 currents arcing and electrical metallic installations caused the explosion?

A. I think that's predicated as the most likely scenario, yes.

Q. Yes, now that is predicated as the scenario in the investigation report and the appendix with a good deal of comment about the goaf and so
20 forth, I'm not concerned with any attribution, I'm looking at the cause here, but in the report, going to the first of those steps with regard to the roof fall or strata fall there is this comment which seems derived from the investigation, and in a sense it's to make sure this is a fair process that I'm engaged in right now.

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Q. The comment that's made, and this is at page 27 of the investigation report, in the second to last paragraph, is that the extension of the panel width in the goaf, in the panel with extraction limits to get the coal, occurred in spite of a lack of specific geotechnical advice and geological
30 data about caving behaviour. Now I take it that comment is the consequence or result of the investigation processes which you are in charge of.

A. Yes.

Q. Looking for information of that kind?

A. That's correct.

Q. So as part of that, and the vast number of documents you obtained, in the investigation report at page 131?

5 A. Page 131?

Q. Yes. And it's at paragraph 3.18.8, 3.18.9 and 3.18.10?

A. Yes.

Q. At 3.18.9 there was reference to communications on the 25th of October 2010 from a Dr Lawrence?

10 A. Yes.

Q. And a letter addressed to an engineer at Pike with a summary of production of modelling arc covers for the panels 1 and 2, and this is expressly concerned with the expansion of the extraction width, and it is noted, it seems from that report or that letter, that extending panel 1 15 meters down dip had decreased strata stability against the planking normal fault, with the conclusion that due to lack of data critical parameters had been assumed which does result in some uncertainty.

A. Yes.

20 Q. So, in trying to put the two statements together with regard to caving characteristics or caving behaviour, it just seemed for the purpose of my question, that you did identify at least that piece of material regarding potential caving or strata fall?

A. Yes, well that material came from reports we'd accessed which were obviously done on behalf of Pike River by, in this case, GeoWorks Engineering.

25 Q. But is that in terms of your investigation the only reference you can find to, within Pike records, a consideration of strata stability or caving behaviour?

A. There was earlier in that section there was a discussion with Pike with Mr St George, which seemed to focus on subsidence implications of amending the design. In other words, extending the panel from 30 metres to 45 metres. There was no discussion in that that we could ascertain about how the increased width will actually affect caving

30

behaviour within the goaf as the report alludes to. So that's simply more Pike River's, I guess, thrust there was more on assuring themselves that there wouldn't be a subsidence at surface level which would bring them into conflict with Department of Conservation. As the report notes, the
5 extra 15 metres of the panel width, that represented a 50% increase in the unsupported span of the panel. I think the critical thing there is, as Mr Lawrence's comment, around due to lack of data. For GeoWorks to come up with the advice they did, they had to assume a lot of critical parameters because they weren't in receipt of information from Pike
10 River which could have narrowed those parameters down in any substantial manner.

1112

Q. Yes, you see the purpose of my question really is not, I noted the substance issue, Dr St George wrote about it or was concerned about it,
15 but it's that passage in the paragraph I referred you to that extending panel 1 15 metres down dip had decreased strata stability against the flanking normal fault which for the purpose of my question seems to be direct commentary on the risk of caving a roof collapse?

A. Yes.

20 Q. It's the only one I can locate in the report. Can I now raise this with you? Do you think there's any other reference?

A. I think there may have been some, there was some reference to if, on page 133, the report of Strata Engineering around the fault that was to the east of the panel.

25 Q. Yes.

A. And subsequent information from Strata that we've obtained and questioning them around the advice they'd given and they have clarified that if had they known that extraction was to be increased 15 metres closer to the fault it would've provided a different kind of advice to Pike
30 River Coal around the viability of extending that panel width.

Q. So that's at paragraph 3.19.7 at page 333.

A. That's correct and it also goes on to then say the fact of safety, this is to discuss the factor of safety being reduced as the panel becomes wider obviously.

5 Q. So, the comment from Dr Lawrence in his letter that we looked at was sent on 25 October 2010?

A. Yes.

Q. So, we're 25 days before the explosion. Did you look for a response within Pike either by way of interview or in record to such advice?

10 A. I can't say with certainty that it was discussed with the geotechnical engineer without having the transcript in front of me and Pike's geotechnical engineer.

15 Q. You'll see the significance of the question I hope Mr Murray, given the highly likely scenario you conclude because at the same page, 131 at paragraph 3.18.10, "The risk of the increased height of sandstone caving is noted is that it would occur as a plate-like failure across the full goaf roof expelling out a large plug of whole concentrated methane into the workings of the mine."

A. Yes.

Q. It's right on the button in terms of the conclusion, isn't it?

20 A. That's correct.

Q. Now –

25 A. If I can just comment on that. The report goes on to say that Pike River should've delayed continuing to increase the size of that goaf until more investigation of the indications of that were carried out. That wasn't done.

Q. Yes.

A. So they went ahead and increased it anyway.

30 Q. Yes, by that answer or by that statement you've identified the reason for my question Mr Murray, I wasn't going to go to that thank you. Now, I want to turn to the way the report addresses the possible ignition sources and this appears at page 77 of the report and I acknowledge immediately that in the report you've covered the whole spectrum of possible causes or sources including contraband, the use of diesel

machinery in a way that was unsafe, a host of things. I'm concerned with this section at page 77 which are the probable ignition sources conclusions and none of which can be conclusively discounted?

A. That's right.

5 Q. The first of those most likely is, as you've said, electrical arcing at the end by electrical equipment such as the fans, the DCBs continuous miners or on conducted metal and this is – I'm not going to ask you technical questions but it's stated as due to high frequency currents caused by the VSD installations.

10 A. Yes.

1117

15 Q. So before I come back to my primary question, we've then got, in a most likely category, electrical arching at the main fan, second of them, and thirdly electrical arching at the gas sensor near the top of the ventilation shaft. And then four, because we've only got four, potential ignition source here in this section is the diesel in vehicle engines, if the safety circuits are defeated or they are poorly maintained and they're right through the mine. Now of those four ignition sources identified, at page 78 of the report, the last of them, the diesel engines, is to a degree put aside by the last sentence at page 78, paragraph 4 at the top. "To support the diesel vehicles as an ignition source would require accepting that the timing of the start-up of the fluming pump VSD was an unrelated coincidence." That's a direct lead-back to the reports findings based on highly technical information and analysis regarding the start-up of the fluming pump is it not?

25

A. Yes.

30 Q. So it's not just an inference, really the report has expressed that, yes, you can't, it could not dismiss a diesel vehicle engine, but when we look at the significance of the start-up of the fluming pump variable speed drive, you'd have to say, well, that's unrelated and this report concludes that it is related?

A. Well, it expresses a strong likelihood that it's related otherwise you'd have to accept that it was purely coincidental.

Q. Yes. Now, because you're not an expert in this area, I simply want to refer to the report in one paragraph to link that statement and it's at page 71, at paragraph 2.43.4 and this is under a heading on the previous page 70, of, "Powerload in the minute before the explosion."

5 And this clearly, and Mr Murray I'll ask you to confirm, is integral to the conclusion that you've reached about the sequence of events which your report or the experts conclude is the likely cause? This paragraph at page 71 refers to the way, as part of the sequence, of the slurry pump system starting up and what's called the loop cooling pump had started, that's evident from the SCADA system and the system was pressurised by 1545 hours, 33 seconds SCADA time or and it's crucial words, in the one to four seconds prior, that is prior to the explosion Mr Murray?

A. Yes.

15 Q. Based on this it's almost certain the number 1 fluming pump VSD had been given a start signal and would have begun to ramp up. This is likely to have occurred in the seconds before the explosion, and there's information from the surface water delusion pressure reported by the SCADA system. So that identification of the moment at which the number 1 fluming pump, VSD, would've begun to ramp up, just seconds before the explosion, is the link to the conclusions reached with regard to the ignition source and putting aside the diesel vehicles because otherwise this is simply too coincidental?

20 A. Essentially, yes, obviously Mr Reczek will be able to describe a lot more detail, because it is a prime-end sequence and a ramping up of the VSD bore so, which occurs over several seconds or tens of seconds, I'm certainly not prepared to comment in much more depth than that around the electrical sequence.

25 Q. No and I won't ask you to. Now, in that sequence there is, we've been through of the goaf report, expulsion of air, expression of air, there is as part of the sequence the knocking out or through of a stopping?

30 A. Yes.

WITNESS REFERRED TO EXHIBIT 34/1

1122

1122 MW

Ms Basher, exhibit 34/1. Do have your laser there beside you there Mr Murray?

A. Yeah.

5 Q. Could you identify on the plan the stopping that is referred to as potentially being knocked out?

A. The stopping in this area here.

Q. Can you go to the screen on the wall, with the laser?

10 A. It's this stopping here. So if that stopping was compromised obviously that's the only barrier between methane then pushing into the intake which would obviously then allow methane into the working areas.

15 Q. Now the discussion about the stoppings is set out at page 113, or part of the discussion, and at paragraph 3.12.12 the department, your department has identified three reasons why rated stoppings would have enhanced the safety of the men underground. Now I'm not concerned with what might have been?

A. Yes.

20 Q. Looking at the evidence that's available to the investigation team, 3.12.13, the most likely scenario, as you've explained, identifies the failure of the stopping in cross-cut three one west through over-pressure from the goaf wall as an early step. And then you refer to stoppings rated to 35 kPa in cross-cut three and four one west would have almost certainly prevented the ingress of methane into the B heading main intake.

25 A. Had they been rated to 35 kPa?

Q. Yes.

A. Yeah.

30 Q. The next point drawn from the expert assistance or opinion is that the over-pressure way to the roof fall would not have exceeded 10 kPa. The inference therefore being if the stoppings had been robust enough to withstand the over-pressure from the goaf wall, the methane would have been carried directly out via panel one through the main return

without going through the active workings, so to reduce the potential ignition sources?

A. Yes, that's correct, yeah. And Mr Reece would probably be able to comment in a lot more detail around that area.

5 Q. So when the comment is made in the next paragraph that the stoppings at cross-cut three and four one west were a questionable strength even for a temporary stopping and not constructed in accordance with underground standards SOP. Where does that derive from? Who is the expert providing that information?

10 A. Well the stoppings, the 35 kPa rating is part of the Queensland standard. What the report alleges and Mr Reece will comment in more detail on that as that – the stoppings weren't designed to any particular standard.

15 Q. So it's his assessment of the stoppings that we'll get to in the course of this week then?

A. Mmm.

Q. Is it your understanding, I think it's in the report, that these stoppings in fact or that stopping was one of at least two that were going to be made permanent stoppings?

20 A. I can't comment categorically on that. I think so but that's probably, but certainly that one was.

25 Q. Now I want to just now to conclude, just clear away a few things that had been very much in the ring in the broader scope of this Commission and no doubt your investigation, but one of the matters that's been recurrent has been the lack of a tube-bundling system?

A. Yes.

30 Q. And desirable though clearly it must be, does it form or the lack of it form any part of the reasons for the conclusions expressed in this report? In other words, you'd had a tube-bundling system. Would the roof fall from the goaf had occurred anyway in the circumstances we infer?

A. Yes.

1127

Q. What would the tube-bundling system have done then in those circumstances to perhaps have prevented this explosion?

5 A. Well, the tube-bundling system would have formed part of their methane management system so in addition to the real time monitoring it would allow greater analysis of gas trending and an analysis of more gases than what was analysed by the real time monitoring system and obviously it would have obvious benefits after the fact of the explosion in terms of the gas make in the mine post explosion.

10 Q. Yes, but does that answer indicate that it's your understanding from your non-technical position that tube-bundling may have provided information about the amount of gas that was in the mine more accurately for the purpose of assessing risk?

A. Well, certainly, yes, it certainly would've confirmed the accuracy of their telemetric system which had several monitors which weren't working.

15 Q. And related to that question the report at page 72 provides some information about the volume of methane necessary to produce the 52 second explosion, expulsion of air from the main drift and we're talking about 2500 cubic metres, it is from the panel with a void volume of 6000 cubic metres of which 5000 could've been filled with methane, 20 this is at page 73 of the report, paragraph 247.2 and in addition to the methane in the void further methane could've been released during a roof collapse from the freshly exposed coal in the Rider seam or from the crushing of the remnant pillar and the stump and it could be, and these are the words of the report, "The release could be very quick and 25 as large as 20,000 cubic metres." Now, my question is that the tube-bundling system may have provided more accurate information about the gas in the mine because the report shows quite clearly that there was not sufficient information held by Pike River about the true extent of gas for a whole lot of reasons?

30 A. Yep.

Q. But in the circumstances described in that paragraph this is an event which is instantaneous and the traffic or flow of the gas is at speed?

A. Yes.

Q. Over a very short distance to the electrical workings?

A. Yes, the tube-bundling wouldn't have had any effect on that at all because it takes a certain amount of time for obviously the gas in the tubes to go to the surface and then be put through their chromatogram.

5 Q. So working backwards to the previous questions and answers what would've made a difference in that sudden and rapid expulsion of air was a stopping which worked?

A. Yes, I'm a bit wary about treading on evidence that Mr Reece is going to give but, yes, but there may be others that Mr Reece will discuss.

10 Q. I think I only have one more question Mr Murray and I may even pass on that, I'm just checking on whether I need to ask you this question. I know you can't give me a technical answer to this question, but the report at page 25 makes a comment which relates to the sudden
15 expulsion of air and it's really to do with what was in place or not in place that may have still had some impact on whether an explosion occurred or not and this is in your heading, "Issues identified in the investigation." Now, it comes six bullet points from the bottom of page 25, that, "Pike River had not installed a pressure transducer or pressure
20 micro-switch to isolate power to the mine in the event of overpressure from a goaf fall. It was foreseeable that the electrical equipment in the mine could be exposed to a big push of gas."

1132

25 Q. Now, until now I didn't have any idea what a pressure transducer was but in the context of what you now know as the investigator, lead investigator, is that intended to convey that had there been a transducer or micro-switch, in the event of overpressure, that the electrical equipment could have been turned off and neutralised? Is that what you're saying?

30 A. I think it's in more in the context and the pressure transducers come directly from advice from the experts so Mr Reece will cover that directly. About additional barriers that Pike could've had in place to either mitigate or prevent happening what happened, so rather than relying on a single barrier than the pressure transducer, I guess its

efficiency in whether it would work becomes a bit of a matter of conjecture but it certainly is something that the experts felt should've been in place and I'll probably have to leave it at that.

- 5 Q. My remaining questions I think are going to be asked by someone else, but I'll flag them anyway in the context of my other questions. The electrical equipment is, for the purpose of classification, either in a restricted or unrestricted zone, and we see that in the exhibit 34/1.

WITNESS REFERRED TO EXHIBIT 34/1

- 10 Q. Just with the laser could you just, there are people in this room who can't see the dotted lines which mark the boundary of the restricted or unrestricted zone. Could you just track it on the screen please?

A. No unfortunately the boundaries aren't there, but essentially the unrestricted zone was this area here and there is a restricted zone was, and it's not a defined line, is areas inbye of that towards the workings.

- 15 Q. Can you see a dotted line there running up to the main ventilation fan?

A. So this is, this area here –

Q. No down at the main ventilation fan, on the hard copy we've have a dotted line which marks it.

A. Oh, in here yes, yes.

- 20 Q. Do you see it? Yes. So now within that area you've just described or shown to the right of that outbye, we have electrical equipment?

A. Yes.

- 25 Q. And am I right in thinking that the conclusion of this report in terms of the harmonic currents is that they are implicated in the potential for the arching which is one of the sequence of events leading to the explosion?

A. The short answer is yes, but Mr Reczek will have to detail that evidence.

30 **THE COMMISSION ADDRESSES COUNSEL ASSISTING – REPORT EXERPTS DISCUSSED**

COMMISSION ADJOURNS: 11.35 AM

COMMISSION RESUMES: 11.55 AM

THE COMMISSION ADDRESSES MR HAMPTON

CROSS-EXAMINATION: MR HAMPTON

- 5 Q. Mr Murray, there are matters of conflict I want to ask you about. I act for the EPMU, the union. First, in some of the initial interviewing that was done of employees, in particular employees of Pike, did the company, that is the Pike River Mining Company itself attempt, and I think successfully at least on some occasions, to have their lawyers sit in on interviews of employees?
- 10 A. Yes, in the very early stages, in the first week or two.
- Q. And did the union have to intervene and say that that was considered to be inappropriate?
- A. Well, at interviews that the company lawyers were present in, the interviewers, the Department of Labour and police interviews were quite clear in asking the company lawyers, who I believe were Bell Gully at that stage although there – during that transition phase, who they were representing and made it quite clear to them and then asked the interviewee if they were comfortable having the lawyer present. The
- 15 EPMU subsequently in discussion, and I recall a bit of a discussion with Jed O'Connell that I had around this, intervened and there was some discussion and after that discussion there was no longer a company lawyer present.
- 20 Q. Did you not pursue that the mere presence of a company lawyer in the same room, even if that person, he or she, didn't intervene in the interviewing process, the mere presence of might be seen as intimidatory of an employee?
- 25 A. I think it depends on the individual but we had limited powers to deny people access and if an employee says they are comfortable with the company lawyer being present it's not for us to say well, no there can't be.
- 30

Q. All right, secondly then on conflict the people that were part of the investigating team, did that include people such as Mr Poynter and Mr Firmin?

A. No, Mr Poynter and Mr Firmin were not part of the investigation team.

5 1200

Q. Didn't Mr Firmin sit in on some of the interviews, say of Daniel Rockhouse and Mr Smith the survivors?

A. Both Mr Firmin and Mr Poynter provided advice and information outside the investigation, core investigation team. Mr Poynter briefed the police team on matters of mine and to clarify various issues in the early days and yes I believe did sit it, one or both of them sat in on some of the earlier interviews but they weren't part of the – they were there to clarify any points rather than actually conduct the interview. They didn't conduct the interview. But they were both there as department employees, obviously.

15

Q. Again, was any thought given by the department to whether it was appropriate that those, either of those two should be sitting in on interviews?

A. Well, they sat in on interviews that obviously we felt weren't of a conflictory nature in terms of their role.

20

Q. In paragraph 11, you spoke of the primary purposes of the investigation including considering the adequacy of the precautions required under the HSE Act taken by a number of duty holders in relation to mining systems and methods?

25 A. Yes.

Q. Given the evidence that have been placed before this Commission concerning the Department of Labour's mines inspectorate and the individual inspectors and the duties of those inspectors, did your investigation include any scrutiny of the department itself in relation to what might have been seen as its possible contribution to what took place in terms of planning, development and actual mining within the Pike River Mine?

30

A. There was a scoping document written up at the start of investigation, part – the investigation that I conducted did not include the role of the department investigation other than in an oblique way obviously around egress and where it intersected with the key investigation components and also we didn't look in detail of the design of the mine, we left that to the Commission and that decision particularly was made an interest of the time, we had to conduct the investigation.

5

Q. I'll break that down a little bit, there was a scoping document, did that include scrutiny of the department's role in terms of the mine design, the planning, the developing and the actual mining?

10

A. No. No it didn't, not in the core context of the investigation.

Q. Well, was there any scrutiny then by the department at all of its role through its inspectorate in how this mine was planned, developed and eventually put into production?

15

A. Well, there was an independent report obtained by the department from Doctors Gunningham and Neal around the department's role and the role of its inspectors, that was separate to the investigation.

Q. So, the Gunningham and Neal is the only scrutiny that was given to the role of the inspectors and the inspectorate?

20

A. Yes, in the context of this investigation, as I said, we didn't examine the role of the inspector. The inspector's not a duty-holder under the Act.

Q. Have you been disturbed at all by the evidence that has been heard by this Commission as to the performance of the duties by the inspectors in relation to Pike River?

25 **OBJECTION: MS MCDONALD (12:04:06)**

COMMISSIONER PANCKHURST ADDRESSES MR HAMPTON

CROSS-EXAMINATION: MR STEVENS

1205

Q. Mr Murray, is it correct that you were head of investigations for the department from the very outset?

30

A. Yes. I arrived in Greymouth I believe on the Sunday after the explosion.

Q. So that would have been –

A. Twentieth.

Q. – the 20th or 21st in fact, I think, of November 2010.

A. Yes.

5 Q. And part of that role was to establish appropriate custody of various items including in your brief you mentioned coke-like material from the top of the ventilation shaft?

A. Yeah, well that evidence was gathered during the course of the investigation, yes.

10 Q. And I think you were a former policeman so you would understand the importance of that and I'm not questioning how it occurred, but you had an understanding of what was necessary for retaining those items safely?

A. Yes, once the investigation got underway, yes.

15 Q. And you've also given evidence today and in your statement about the engagement of several experts and that I think you added today that they came to New Zealand a lot and you spent quite a bit of time with them. Is that fair?

A. Well on several occasions, yes they came over. We've been in constant
20 contact with Mr Reece in particular.

Q. And I just want to explore with you one of the reports filed on the Commission's website over the weekend from one of those experts you mentioned and that's a Mr Colin Ward. You familiar with Mr Ward who's mentioned in your brief?

25 A. Mr Ward, yes.

Q. Yes. And there is a document. Ms Basher, perhaps if we could have it up. DOL3000.14.0006.

WITNESS REFERRED TO DOL3000.14.0006

30 Q. But I presume the investigation has, Mr Murray, consumed pretty much all of your time since that weekend back on the 21st of November 2010. Would that be fair?

A. It's certainly consumed a majority of my time for the first six or seven months. In recent months my role as head of investigation has been

more in an oversight role with counsel assisting and Mr Stewart as investigation manager pretty much runs the day to day investigation and the correspondence with the various experts.

5 Q. Would you have read the various reports that have been filed by the department in respect of the investigation?

A. Sorry, could you repeat that?

Q. Would you have read the various reports filed by the department in respect of the department's investigation?

10 A. I read most of the reports. I may not have read all of the very recent reports and correspondence, particularly around some of the electrical stuff over the Christmas break.

Q. I think Mr Ward, it would appear, was involved in the analysis of the samples taken from the top of the ventilation shaft, correct?

A. Yes, it would, yeah.

15 Q. And that analysis was to give information about the initial explosion wasn't it?

A. Yes.

20 Q. And it was therefore one of the early samples that was taken and ahead of the second and subsequent explosions, to be able to give information about the first explosion?

A. Mmm, I can't comment when the exact samples were taken, sorry.

Q. Are you aware that, well do you know that the samples of that material were gathered up by Mr Robin Hughes prior to the second explosion? Are you aware of that?

25 A. No I wasn't.

Q. But you can confirm they came from the top of the ventilation shaft?

A. Yes, yeah.

30 Q. And if you have a look at the document that's been brought up, headed "Further notes on shaft samples from Pike River Mine," that's dated October 10th 2011?

A. That's correct.

Q. And was that about the time that that material was analysed to the best of your knowledge, sometime in late 2011?

1210

A. Yeah, I'm actually not sure when that material was analysed and Mr Reece could probably answer that question.

5 Q. Well, are you aware if you had that analysed as soon as you started your investigation or was it sometime later after the mine had been sealed?

A. Look, I don't recall when the exact time was that analysis would've taken place on it, a lot of the material was supplied to the various experts over time, some analysis was done – a lot of analysis was done
10 by various parties, I don't recall the exact dates or when material was analysed.

Q. What I'm trying to understand Mr Murray is are you able to say if that was done in the first week?

A. No, personally I'm not, no, I'm not.

15 Q. And so, sorry, just to be clear who would know that?

A. Well, it's part of, it forms part of the expert evidence, certainly Dr Cliff would be the person who was dealing with a lot of that evidence, the first week of the investigation, well, the investigation didn't start until the 29th of November so the first week after the explosion was very much a
20 recovery and the investigation team had very little to do with starting the investigation at that time because we didn't have access and obviously efforts were concentrated on the rescue efforts.

Q. So, we can assume that that analysis wasn't done in the first 10 days after the explosion?

25 A. If you're talking about the first 10 days after the explosion, no, it wouldn't have been, certainly not by us.

Q. Now, have you read this document or do you understand why that analysis took place just broadly?

A. I haven't seen this document, no.

30 Q. Are you aware that those samples that while you analysed the amount of coking in the coal forced out by the explosion is to give an indication as to the temperature the coal would've been exposed to in the explosion?

A. Yes.

Q. And that's from the discussions that you've had with the experts, correct?

A. Well, that's from information in the report from the experts, yes.

5 Q. And that analysis can also give an indication of how long that coal that was forced out by the first explosion was exposed to that heat, can't it, are you aware of that?

A. I would imagine that's a likely inference, yes, I presume from the degree of coking of the coal.

10 Q. And another inference from the analysis therefore is what temperature would've been within the mine at the time of that first explosion, correct?

A. Yes.

Q. Yes. As head of the department's investigation team into Pike have you been generally following the Commission's hearing?

15 A. Yes I have, I can't confess I've sat there and listened to it on a daily basis but I've kept abreast of proceedings.

Q. You would be aware that a critical issue at the time of the rescue and recovery was the survivability of conditions within the mine following the initial explosion?

20 A. Yes.

Q. And I wonder if we could go to page 3 please Ms Basher of that report, just highlight the first full paragraph. If you want time to read that Mr Murray please take it.

A. Yes.

25 Q. And it's your understanding that from that information it's able to be determined that the heat within the mine from the initial explosion could've ranged from 500 to 900 degrees Celsius?

1215

30 A. Yes, I'm just trying to recollect the issues around this, but there's no way of knowing obviously where that coal particulate came from within the mine, so it's quite a broad deviation on potential ranges but I'm quite happy to accept that as a...

- Q. Yes, and was it your understanding that you have that range because some particulates would have come from some parts of the mine and some of the particulates from others and therefore you could have a range that almost doubled from 500 degrees Celsius to up to 900 degrees Celsius?
- 5 A. Yeah, that's my understanding.
- Q. And would you accept this as the head investigator that that information was likely to be highly relevant to the question of survivability following the initial explosion?
- 10 A. Well I'd imagine it would be relevant to certain areas of the mine where the temperatures were at that range yes, but I can't comment that the mine was in that temperature range throughout the whole mine.
- Q. But you were presumably aware from an early time that the mine was in development and it was a relatively small mine at the time it exploded?
- 15 A. Yes. But I'm also aware that Mr Rockhouse suffered no effects of blast damage. Therefore, the explosion had mitigated in terms of the flame front well before it reached him.
- Q. And where was Mr Rockhouse when he suffered; in fact, when he was I think knocked unconscious wasn't he?
- 20 A. Mr Rockhouse was in pit bottom stone so he was roughly 500 metres from Spaghetti Junction. So, as I say I'm only a layman but I wouldn't imagine that a 900 degree centigrade heat would have been mitigated in that short a distance for Mr Rockhouse to suffer no effects of burning at all.
- 25 Q. But he was about at least a half a kilometre away wasn't he?
- A. Yes.
- Q. And is my recollection correct that Mr Rockhouse was the closest survivor to pit bottom?
- A. He was there, yes, him and Mr Smith. He was closer to inbye, yes.
- 30 Q. And even half a kilometre away from pit bottom his evidence raised, did it not, the intense heat from the blast?
- A. I think it was more of a flash. I don't recall him talking about intense heat.

Q. Do you recall evidence of many of the local mining experts, that they were very frustrated immediately following the explosion that in their views the consideration of survivability was being stifled by, amongst others, the department?

5 A. I followed some discussion of that around the recovery time. My focus was obviously on the investigation and setting up the investigation phase, but I'm aware of the discussion that occurred at the time.

Q. And are you aware that at least some of those same experts were predicting that the mine would re-explode unless it was inertised and sealed?

10

A. I can't remember the exact conversation but I'm happy to accept that was part of the discussions that were occurring.

Q. And that there was discussion that further explosions were likely to make any recovery more difficult if not impossible?

15

A. Yes that would be an obvious conclusion to that.

Q. Are you aware, and you may well not be, that Mr Hughes when he took those samples urged that they be quickly analysed to aid consideration of survivability?

20

A. No I'm not and the analysis at that stage would have been in the hands of the police team who were under Gary Knowles and part of the recovery, not as part of our, certainly not a part of our investigation at that stage because it hadn't commenced.

Q. You'd accept wouldn't you from your involvement in the investigation over the last nearly year and a half that it's a highly technical field?

25

A. There's certainly a number of technical areas that were traversed, yes.

1220

Q. Do you think now knowing that the initial explosion was between 500 and 900 degrees illustrates why a mining expert should control any rescue or recovery involving coal mines?

30

A. Well, I think that's an issue for the Commission to comment on not me, to be quite honest.

Q. Yes, but with respect sir, you've spent the best part of a year and a half investigating it and you've just said that there are a number of technical issues so unless I'm stopped I would be interested in your opinion?

THE COMMISSION ADDRESSES MR STEVENS – LINE OF QUESTIONING
5 DISCUSSED

CROSS-EXAMINATION: MR WILDING

Q. Mr Murray, I'd just like to understand whether the department had access to any of the variable speed drives. In paragraph 3.37.10.5, of the department's report page 160 to 161, it states, "Five VSDs were
 10 removed from the site with what were described as power structure failures."

WITNESS REFERRED TO DEPARTMENT OF LABOUR REPORT
PAGE 160-161

A. Sorry Mr Wilding could you just refer that paragraph again?

15 Q. Page 160, the very bottom paragraph, "Five VSDs were removed from the site with what were described as power structure failures."

A. Yes.

Q. And then in paragraph 3.37.10.7 on page 161, it states, "PRCL in consultation with Rockwell, then replaced the 700L water-cooled VSD
 20 with a more powerful 500 kilowatt, 700H air-cooled VSD over the weekend of 29 to 30 October."

A. (no audible answer 12:23:19)

Q. Are you able to tell us where those VSDs were returned to?

A. My understanding is that they were returned to Rockwell.

25 Q. And whereabouts is Rockwell based?

A. Well, they're based in Australia and in the US. My recollection I believe it was that two went back to Australia and three went back to America but I stand to be corrected on that.

Q. Having regard to the importance of VSDs as a potential cause, did the
 30 department seek access to those VSDs?

A. We followed up with Rockwell as to whether they had analysed the failures of those VSDs and whether they had a report alluding to those

failures, we were advised in writing from them that they actually had no such report which I confess I found a bit bizarre at the time but they did supply an amount of data over several months after that that we'd requested but the last of that didn't arrive until January.

5 Q. So you haven't sought or had physical access to the equipment?

A. No not those VSDs.

Q. So that information that was received up to January this year, presumably then wouldn't have been able to be taken into account for the purpose of this report which of course was published last year?

10 A. That's correct and we've alluded to in the chapter on electrical safety that we are still continuing with some lines of inquiry around that and the VSDs are obviously one area of that.

1225

15 Q. And you will update that aspect and presumably advise the Commission of any updated view?

A. That is the intention. The delays for several months was toing and froing with the letters from lawyers obviously, why we wanted to see them, what purpose did it serve et cetera, et cetera.

20 Q. Are you able to indicate how long it might take for that material received to be considered and reported on?

A. Well, that's probably an issue for Mr Reczek to address, he is in receipt of that material now.

Q. I just want to turn to a slightly different issue which is the people who you may not have been able to interview or speak with.

25 A. Yes.

Q. During the inquiry, you had a couple of limitations in relation to witnesses, one presumably was the 12 month timeframe?

A. Yes.

Q. And another presumably that some of the witnesses were overseas?

30 A. Yes, we did travel to Australia and interview a number of witnesses though.

Q. If I could just go through some names to find out whether they either have been spoken with or will be spoken with. The first is Jim Rennie

who was a ventilation consultant from Australia who gave advice to Pike River as late as August 2010, was he spoken with?

5 A. No, he wasn't spoken to initially. We are intending to speak to him because some of his work has come to light through other statements but quite late in the piece, as late as November.

Q. Do you know when that's likely to occur?

A. I think we're in negotiations at the moment to speak to him. Mr Stewart advised me the other day.

10 Q. I gather from the reference in paragraph 3.19.7 of the DOL report that you've had email communication with Strata Engineering?

A. Yes.

Q. Is that correct?

A. That's correct, yes.

15 Q. Have you spoken with anyone from Strata Engineering, who provided assessment in relation to wind blast potential in August 2010?

A. No, we haven't interviewed them. The reports from consultants were analysed by relevant experts on our team and the decision was made that only if there was discrepancies in those reports or advice, because obviously it's a complex area, we wouldn't be able to assess the veracity of those reports, would we then go back and seek clarification, we did that with Strata around some of the advice that they'd given and they did respond in writing to us.

20 Q. I've just got four more, Dr William Lawrence from GeoWorks Engineering which reported on the hydro-panel width?

25 A. Yes, similarly to Strata Engineering, where we had his report which we assessed and analysed and we took the limitations of the report which were acknowledged by him, we didn't see that we needed to actually interview him on aspects of that on advice from our experts.

Q. What about Udo Renk who was the technical services manager?

30 A. We spoke to Mr Renk on several occasions including a two hour conversation by phone with Mr Renk in Canada and we've had discussions with him since and we will be speaking to him again.

Q. And I take it that if the Commission seeks the outcome of that you will advise it of that?

A. Yes, certainly.

5 Q. What about Tony Goodwin who was the engineering manager at one stage?

A. I can't comment sorry on Mr Goodwin.

Q. And just finally, Jerry Wallace of Hawcroft Consulting who conducted insurance audits?

10 A. We obviously are in possession of the audit. At the time of the audit there wasn't anything that came out of it that we felt we needed to speak to them about, there was subsequent information that covered off a number of the areas around the audit, obviously if we feel as we go forward that we need to consult with him or speak to him on various aspects we could do so.

15 Q. If I could just turn to another aspect which is the sources of the standards referred to in the report, and the report draws on regulations and guidelines from overseas in various parts.

A. Yes.

20 Q. And I presume that's because there were a number of relevant matters that weren't covered by New Zealand legislation and regulations?

A. Yes, that's correct.

1230

Q. And it also refers to the Minex guidelines which are an industry promulgated guideline, is that correct?

25 A. Yes.

Q. And once again, that would be because of the lack of a, essentially an impartial government promulgated industry specific code or guideline?

30 A. Yes and also that Pike River had referred to adopting a number of overseas standards, particularly Queensland standards in certain areas, so obviously we looked at those standards to see if they'd met the requirements of the standards they were putting up. The other issue was obviously comparing what is best practice in New Zealand with overseas we, in addition to Pike River, we really only have one other

large company here which is obviously Solid Energy, we couldn't rely on just comparing Pike River with Solid Energy for obvious reasons so we had to sort of go further afield of that in terms of looking at international standards and what is acceptable overseas, particularly Australia.

5 Q. In an investigation such as this, would you be assisted by New Zealand promulgated codes and guidelines?

A. Yes, insofar as they relate to specific issues, but we are also greatly assisted by Mr Reece and other experts in terms of their knowledge of Queensland and Australasian standards.

10 Q. Just finally I want to turn to a topic touched upon by Ms McDonald QC and Mr Davidson QC which are the steps that the Department intends to take now to identify the cause of the tragedy. What advice does the Department have about when there will be access likely to the drift?

15 A. Well, we're working with the Pike River manager at the moment and we've had correspondence with him as recently as last week. We don't envisage that it'll be a matter of weeks, we envisage it probably will be a matter of months. We've gone back to Pike River receivers and via the mine manager and told them what we require from them which is a process from go to whoa, if you like, of the recovery of that drift and they, as far as I know, they're preparing that. Those conversations have been between the manager and Mr Taylor who is the acting chief inspector of mines at the moment.

20 Q. Upon access to the drift, what steps does the Department intend to take?

25 A. Well, obviously we'd have to look at the forensic evidence as I say, Mr Reczek is keen to examine the VSDs, obviously that examination may have to be done by a third party given the difficulties of going in there and possibly, quite possibly Mines Rescue, I think to a large degree it would depend on what we find in the drift and the conditions in the drift and we'll be guided by, to a large extent, by Mines Rescue around that.

30 Q. Appreciating that there are a number of uncertainties are you able to give an indication of how long it might take from when there's first

access to the drift for the Department's experts to examine that and then provide a report back to the Department?

- 5 A. No I certainly can't say with any clarity around that. It would depend on what evidence is in there and how valuable it is forensically. I did discuss this matter earlier on with Dr Cliff after the subsequent explosion around forensic evidence and his opinion at the time was that the subsequent explosions would have obviously had a big impact on the value of forensic evidence but until we have access to it it's obviously difficult to determine.

10 **THE COMMISSION ADDRESSES MR HAIGH – ORDER OF QUESTIONING**
1235

CROSS-EXAMINATION: MS SHORTALL

- 15 Q. Mr Murray, one of the primary purposes of the Department of Labour's investigation as I understand it from your evidence, was to establish, if possible, the cause of the explosion on the 19th of November 2010, is that right?
- A. Yes that's correct.
- 20 Q. And I don't want to linger on this but I just want to confirm a couple of matters with you. It's not been possible for the actual cause of the explosion to be established has it?
- A. No, not with certainty.
- Q. Rather, the Department of Labour's investigation has only been able to identify potential causes, right?
- A. Yes.
- 25 Q. And there's actually ongoing doubt about what caused Pike's mine to explode on the 19th of November 2010 isn't there?
- A. Yes.
- 30 Q. Now, the Department of Labour's investigation into what caused the explosion on that day relied chiefly on interviews and documentary evidence from various parties. That's your evidence isn't it?
- A. As well as obviously gas modelling that we looked at and I guess what you'd refer to as hard data, a lot of which came from the SCADA system

and various documentation from power companies around power draw, et cetera around the electrical area.

5 Q. So it follows doesn't it, that if individuals weren't interviewed or if documentary evidence was not available, information from those individuals or documents wouldn't be reflected in the Department of Labour's investigative findings, right?

A. Yes, it's quite possible with the obvious proviso that that information may have been covered by other witnesses or other documentation.

10 Q. Well are you familiar with evidence given to this Commission by the likes of Neville Rockhouse and Don Elder that Pike River was under financial pressure that may have compromised safety in some respect?

A. Yes, I'm aware of that evidence.

15 Q. And the department has observed as part of its investigative findings hasn't it, that Pike should have expended cash to purchase certain additional equipment like extra sensors and detectors?

A. I need to be clear here that the issue isn't all around cash and purchasing ancillary items to ensure safety. It's around systems and processes and culture also.

20 Q. Well, would you agree with me that individuals employed by Pike in its finance department might have knowledge of any alleged spending restrictions at Pike?

A. Well some individuals certainly would. I would imagine the chief financial officer would.

25 Q. But the Department of Labour didn't interview the chief financial officer at Pike did it?

A. No we didn't.

Q. And the Department of Labour didn't interview anyone in the finance department at Pike as part of its investigation did it?

A. No we didn't.

30 Q. The Department of Labour didn't interview Pike's purchasing coordinator, did it?

A. I'm not sure whether we did or not actually, on that score.

Q. Well do you understand that the Department of Labour and police have provided to this Commission hundreds of interview transcripts?

A. Yes.

5 Q. And I'll put to you that having been through those, I can't find or no one in my team can find an interview of Pike's purchasing coordinator. Do you have any reason to believe –

A. No I'm quite happy to accept that.

Q. And Pike's stores supervisor hasn't been interviewed by the Department of Labour as part of its investigation, has he?

10 A. No.

Q. In fact, the department didn't interview anyone in the purchasing department at Pike as part of its investigation did it?

A. I believe we interviewed the logistics manager. I can't recall the man's name.

15 Q. You don't recall anyone else connected with the purchasing department having been interviewed do you?

A. Well other - not directly concerned to the purchasing department, no.

20 Q. Now you've also given evidence that systems at the mine, including their design and the technical experience of managers were focus areas of the Department of Labour's investigation, right?

A. Correct.

25 Q. Mr Wilding has asked you about some individuals and whether the department spoke to them during their investigation. I'd just like to put some additional names to you. The department didn't interview Corrie van Wyk did it?

A. I can't comment whether we did or not, sorry.

Q. And again, if I tell you that having gone through the interview transcripts our team has found no evidence of such an interview being conducted?

30 A. Quite happy to accept that. As you know, we've conducted nearly 300 interviews. I don't know them all by name.

Q. As I understand, this gentleman was the acting tunnel manager from August 2006 until August 2007?

A. I'd quite happily accept that.

1240

Q. The Department of Labour didn't interview Kobus Louw, did it?

A. Mr Louw's name is quite familiar but if you don't have a transcript then perhaps we didn't, but Kobus Louw's name is very familiar.

5 Q. Yes, it comes up often, doesn't it, Mr Louw's name? You understand that Mr Louw was the tunnel manager at Pike from August 2007 until October 2008 when the tunnel hit coal and then he was the mine manager from October 2008 until February 2009. Do you recall those details sir?

10 A. Yes.

Q. The department didn't interview Mick Bevan, did it?

A. Don't know.

Q. Mr Bevan was the mine manager from February to April 2009, right?

A. I'd have to accept that.

15 Q. Well, let me just try one more, the Department of Labour didn't interview Mick Lerch either, did it?

A. Once again, if you say we didn't, we didn't.

Q. Well, I'm just working from the transcripts that have been provided to the Commission?

20 A. Well, I don't have the transcripts in front of me and with over 300 witnesses I can't remember exactly everyone we interviewed by name.

Q. Well, if I put to you that our team has not been able to find an interview transcript of Mr Lerch?

25 A. I'm happy to accept that and some of those is, it's not every witness is willing to be interviewed also, we don't have any compulsive power to interview everyone we want to interview.

Q. Do you have any recollection or reason to believe that Mr Lerch would refuse to be interviewed?

A. I don't in Mr Lerch's case, no.

30 Q. Do you understand that Mr Lerch was the mine manager at Pike from December 2009 until June 2010, just months before the explosion?

A. Okay.

Q. Do you understand that?

A. Yes.

Q. Now, you've given evidence that the Department of Labour immediately deployed staff to the mine to provide assistance on the 19th of November. Do you recall that evidence? It's in your brief?

5 A. Yes, yes, yes.

Q. And those staff based themselves at the mine site offices, right?

A. On a shift rotational basis, so the staff were based in Greymouth and unlike the police we didn't have the luxury of having enough staff to run around the clock so essentially we had three or four people who had the expertise to assist and obviously those staff couldn't be available
10 24 hours a day so we made them available on a rotational basis.

Q. And do you understand that emergency support and staff, including Department of Labour employees, were working and in some occasions effectively living in Pike's offices up at the mine site in the days and
15 weeks following the explosion?

A. I believe so, at the control base, yes.

Q. In the midst of company file cabinets and documents, right?

A. Yes, well, I don't know that they were working in the midst of the company documents, I'm not sure personally what room they actually
20 inhabited and whether, what Pike's security arrangements were right at the time. We did take video footage of their file room shortly into the investigation and I think I believe even before then, it was very early on anyway.

Q. I think you said earlier in response to questions you arrived at the site
25 the weekend after the explosion. Is that right?

A. I arrived in Greymouth on the Sunday, yes.

Q. And did you go up to the mine site at that time sir?

A. No I didn't.

Q. Do you recall whether the Department of Labour did anything to secure
30 access to documentation when it arrived at the mine site?

A. Yes, we asked that documentation be secured by the company, we had no reason to believe they would not do that.

Q. And do you recall whether there were any difficulties around that, given that as part of the emergency efforts, I'm not being critical of that –

A. No, no.

5 Q. People needed to be in the working offices of management at the company?

A. Well, yes, I mean obviously it was a very busy time up there. I mean there was a conscious decision made by myself at the time to – and the reason and discussion with police while the investigation formally started on the 29th was to not get in the way or be seen to be hampering any recovery, rescue efforts to sort of start running round asking people questions when they were dealing with, you know, the emergency issues.

10 Q. Would you agree with me Mr Murray that there's a risk that the integrity of the documentation and its very preservation may have been compromised at the time?

A. Well, that's always a risk, yes, in any investigation.

15 Q. It's possible that some documentary information was misplaced or even lost, isn't it?

A. It's possible.

20 Q. Now, I'd just like to ask you about some of the evidence that's been put before the Commission already around factors that may have contributed to the explosion and the extent to which some of those same topics may have been covered in the department's investigation, I'm doing this just to orientate you Mr Murray, I'm doing this based on the transcripts of interviews that have been provided by the Department of Labour and the police to the Commission and on my count there have been 253 such interview transcripts provided.

1245

30 Q. So with that orientation, I just wanted to ask whether you understand, and this is based on my count, you may not recall the specific details, that 205 of those 253 interviewed individuals worked underground at Pike at some point?

A. Well, I'm quite happy to accept that if that's the...

Q. And are you familiar with the evidence given before this Commission from the likes of contractor Albert Houlden and consultant Oki Nishioka that they didn't feel safe underground at Pike?

A. Certainly I recall the conversations that the Commissioner around that.

5 Q. And do you understand or recall that the Department of Labour investigators asked at least 85 of the 205 men they interviewed who had worked underground at Pike whether they too didn't feel safe?

A. Yes.

Q. And the majority of the men said that they did feel safe didn't they?

10 A. Yes.

Q. Are you aware that the department investigators asked 78 of the 205 men they interviewed who worked underground how they found their training and induction at Pike?

A. Yes.

15 Q. And the majority of those men too commented favourable about their induction and training didn't they?

A. Yes they did in general but then again some of them didn't have anything to compare that level of training against because they were new people at the mine.

20 Q. Are you aware that the department investigators asked 76 of the 205 men they interviewed who'd worked underground what they thought of stone dusting at Pike?

A. Yes, stone dusting was an area covered yes.

25 Q. And are you aware that the majority of those people too, when asked by department investigators, reported that stone dusting was done frequently?

A. I'm not aware of that but I don't accept that, well, done frequently and done well are two different topics.

Q. My question is about the frequency?

30 A. Yes.

Q. Now, are you familiar with evidence given before this Commission from the likes of Neville Rockhouse and Don Elder that they believed production pressure compromised safety at Pike?

A. Well, obviously that was an assertion that Mr Elder made but I don't recall whether how strongly that was tested.

5 Q. Well, I just want to put to you that whether you recall that the Department of Labour investigators asked at least 50 of the 205 men they interviewed who had worked underground at Pike, whether they felt production pressure or whether they felt it affected safety. Do you recall that line of questioning?

A. Yes.

10 Q. And do you recall that the majority of those men, too, the majority of those 50 men to whom the questions were put said in response either that they felt no production pressure or that it had no affect on safety?

A. I recall that would be their subjective opinion obviously yes.

Q. Just as they've been other subjective opinions put to this Commission, right?

15 A. Correct, but there's some factual data around production which obviously hasn't been put to the Commission.

Q. Now you've said in your written brief that the availability of experts to assist the Department of Labour with its investigation was a significant issue and you've talked about this this morning as there's only a small pool of relevant expertise in Australasia, right?

20

A. That's correct.

Q. And the issue there is that there's simply not that many people who really understand the complex issues that surround matters like ventilation, engineering and gas management and electrical engineering in an underground coal mine right?

25

A. Well, I think we need to qualify that by the term available, I guess. There may well be engineers who are working in-house for companies who understand it fully well but we don't have access to those people so around consultants the pool is relatively small, as mining is relatively small in the scheme of things.

30

Q. And that's my point, the pool of consultants available is relatively small isn't it?

A. Yes, yes.

Q. Now, knowing that you needed expert assistance to try to determine what caused the explosion at Pike River, am I right that the Department of Labour, and perhaps even you Mr Murray, put together a list of sorts of people that it thought had expertise in the areas that would be required to be addressed, like ventilation engineering, and gas management and electrics et cetera?

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A. Yes. What we did was seek advice from the Queensland Mining Authority primarily on who they considered would have the expertise to assist us in this area, and we also spoke to a range of others as well and other people in the industry and came up with a list, and then once we had Mr Reece on board he also assisted. And there was obvious people such as Dr Cliff who was already on the scene, I guess if you want to say that, who had agreed and was considered by everyone we spoke to as the foremost authority on gas explosions. So it was a little bit of a no brainer to get him on board for us.

10

15

Q. And so with the assistance of these others that you've described, the department put together this list of people who appeared to be well qualified, right?

20

A. Of the core experts say, yes.

Q. Well before you reach the core expert team, I'm just asking about your processes?

A. We had a list, yes we had a list yes.

Q. And would you accept on that list, based on the assistance you had from others, and I understand your point here?

25

A. Yes.

Q. Appeared to the department to be well qualified?

A. Yes.

Q. And experienced?

30

A. Yes.

Q. And when Department of Labour then contacted some of those people it found, didn't it, that some were conflicted from being able to assist?

A. Are you talking about the wider list?

Q. Yes.

A. Yes.

Q. And that's because they had previously in some way been involved with the Pike Mine, right?

5 A. Some were involved with the Pike Mine, some, a ventilation engineer, was working for Solid Energy who we were, initially was in our list. He wasn't available. Solid Energy wouldn't make him available through a perceived conflict of interest on their part, and I don't say that in a judgmental way, that's just the fact of the matter. Yes, so some of them
10 did. Some of them had worked at Pike. But I think in the industry this size it's very difficult to find someone who doesn't have, hasn't worked for somebody sometime. So it was a matter of assessing that level of conflict and the areas that they were going to be giving advice in. And it's also a matter of assessing, I mean these people are experts in their
15 field, and if I use Dr Cliff as an example. He consults widely across Australasia. It's a matter of his professional integrity obviously also that the advice he gives will be dispassionate and so yeah. It's the assessment that we made on that case.

Q. Well am I right, Mr Murray, that at least some of the experts the
20 Department of Labour contacted to assist it off this broader list that we've talked about had previously been engaged by Pike to help Pike develop its mine?

A. Yes I believe so and I believe, I don't recall the exact big list that we had but I believe Mr Rennie was perhaps one of those.

25 Q. Now I'd just like to cover very briefly some of your evidence earlier. You described the work that was done by experts beyond the core panel of five as part of the department's investigation. I don't want to go back through that. Again just for the record, it's at paragraph 22 of your written brief?

30 A. Yes.

Q. And you describe that experts like, for example, SafeMine Engineering had been engaged to examine, for example, they were engaged to examine the diesel equipment above ground, right?

A. Yes, they were I guess you'd term subject matter specialists.

Q. Now you didn't say when experts like SafeGas came in to do that work. Was it immediately after the explosion?

5 A. SafeMine came in, no it wasn't immediately after the explosion. It was several months afterwards when they were available.

Q. And I just in the interests of time and to move through this, and I'm not actually sure whether these documents have been loaded by the department into the Commission's system yet, it's summation system, but we received just over the weekend I believe a report from SafeMine based on the audit work that they had done?

10 A. Mmm.

Q. And I'm just in the interests of time just going to put this to you. It's from the document, and for the Commission's record because I don't have any number, it's dated the 18th of May 2011. It's from SafeMine Engineering to Keith Stewart, the Department of Labour. "My audit work was undertaken some months after the closure of the mine following the disaster. During that time the machines were not used (or really used on the surface) and were not fully maintained. This may have caused or contributed to some of the non-conformances/non-compliances identified. The audits were a snapshot taken as at the day they were undertaken." And do you recall, Mr Murray, that there were these kinds of issues with some of the subject matter experts work where there was a delay in time, whether through available – again I'm not criticising –

1255

25 A. No, no that's fine.

Q. – whether through availability or other factors, they were not able to inspect the likes of equipment until many months after the explosion?

A. Yes, sometimes and understandably any – a person in such a position as SafeMine, would put that qualifier on their, on their report.

30 Q. So to the extent, as you said earlier in response to questions from Ms McDonald that the Department of Labour was seeking, with the diesel vehicles in particular, to get an indication of the state of the machines underground. That's my written note as to what you said, the

transcript will be the accurate reflection, the machines inspected had actually sat above ground for some time, hadn't they?

A. Sometime since the explosion, but they'd been actively used under mine immediately before the explosion. Some of them on the previous shifts.

5 Q. Now the panel accepts, the expert panel accepts that there are a number of significant potential emission sources within the mine, none of which can be conclusively discounted or assured as the likely cause at this point, right?

A. That's correct.

10 Q. And the sources considered most likely by the expert panel, and I believe Mr Davidson traversed some of this with you earlier, are electrical arcing and diesel vehicle engines, right?

A. Yes.

15 Q. And we're going to hear from Mr Reece around this I believe, the expert panel has formed the view that there are three scenarios, or three possibilities, that are less likely to involve a diesel vehicle as the ignition source because of, and I'm referring to evidence that Mr Reece will give, and I just want to cover a point briefly with you given Mr Davidson's questions earlier, because of the status of Pike's electrical equipment and the timing of the electrical plant start-up, right?

20

A. Yes, that's right the pumps start-up.

Q. But the Department of Labour cannot entirely rule out, can it, that a diesel vehicle provided the ignition source in any of its scenarios, including its first three, right?

25 A. That's correct I guess the question's one of magnitude of probabilities, yeah.

Q. It's possible, isn't it that the timing of the electrical plant start-up was nothing more than a coincidence, isn't it?

30 A. It is, but the primary source of the diesel vehicle would've been the drifrunner driven by Mr Hale which was active in that area it was in, I guess the problematic issue there is around a fuel source and the lack of alarms.

Q. And I'm going to come to some of this diesel vehicle line questioning with Mr Reece, Mr Murray –

A. Yeah.

5 Q. – because I accept that you are – you don't have the technical expertise, but my point is simply that the Department of Labour hasn't been able to rule out, has it, that the electrical plant start-up was just a coincidence?

A. No we can't rule out that.

10 Q. Now it's also the Department of Labour's view, based on its investigation, that contraband can't be ruled out as a source of ignition on the 19th of November 2010 at Pike, right?

A. That's correct.

15 Q. And that's because contraband items like matches and lighters, cigarettes, battery powered watches, cameras, cellphones, aluminium cans and food wrappers, can provide a source of ignition for an underground explosion, right?

A. I think some of them can, yes.

20 Q. Would you have any reason to dispute that all of those items that I've just listed Mr Murray are identified in the Department of Labour's expert report as "potentially being contraband that could provide a source of ignition for an underground explosion?"

A. Yes and they've obviously come from issues in other mines around various past incidents.

25 Q. Now the Department of Labour in its investigation found that Pike employees and contractors were made aware of what items were considered contraband and prohibited underground through the NZQA unit standard 7146 training, right?

A. Yes.

30 Q. And the Department of Labour found in its investigation that contraband was strictly forbidden to be taken underground at Pike, right?

A. Yes as it should be.

Q. And if I could ask Ms Basher, just look at one document before the lunch adjournment, to pull up a presentation entitled, "Contraband rules

presentation.” If it isn’t already loaded into summation its only because of some technical difficulties, but instead of giving the number we might just pull the document up and my question to you Mr Murray is whether you recognise this document as a PowerPoint presentation that was made available to the police and Department of Labour during the investigations at Pike?

5

A. Yes.

Q. Do you have any reason to believe that the presentation wasn’t provided as part of training efforts at Pike?

10 A. No I’ve got no reason to believe that.

Q. And if we could just, Ms Basher turn to page 2 of this document which is dated, just for the record to be clear, May 2010, turn to the second page, do you see there Mr Murray the clear training and I’m reading from the document, “You shall not take underground any contraband, articles or smoking materials that may provide a source of ignition.”

15

A. Yes.

Q. And the Department of Labour investigators Mr Murray found in the course of their investigation and interviews with Pike miners and contractors that the contraband rules were clear to everyone, right?

20 A. Correct.

Q. And there were signs and posters around the mine reminding the employees and contractors that contraband and smoking materials were prohibited underground, right?

A. I believe so, yes.

25 **COMMISSION ADJOURNS: 1.01 PM**

COMMISSION RESUMES: 2.02 PM**CROSS-EXAMINATION CONTINUES: MS SHORTALL**

- 5 Q. Mr Murray, I've just got a couple of questions just to clean up some topics that I was asking you about before the break and as I understand it Mr Reczek will provide evidence from Monday about the electrical systems at Pike and the possibility of electric arcing providing a possible ignition source for the explosion, right, and so I just wanted to confirm that in the department's investigation, the Department of Labour didn't
- 10 interview anyone from iPower which is the company that designed Pike's electrical system, is that right?
- A. We were in correspondence with iPower, we didn't have a lot of joy in getting a lot of response from iPower hence we went to Rockwell directly. To the best of my knowledge I don't think we received any
- 15 substantial documentation from iPower but iPower were the actual sort of agents for Rockwell in New Zealand so effectively it wasn't a limiting factor in that we went straight back to the source as in Rockwell.
- Q. And the department didn't interview anyone from Rockwell either, did it?
- A. No, Rockwell corresponded with us via their legal team.
- 20 Q. So, no interviews of personnel?
- A. No.
- Q. And AMPControl supplied the equipment for Pike River's electrical system, is that right?
- A. Yes, that's correct.
- 25 Q. And the department didn't interview anyone from AMPControl as part of its investigation into the Pike explosion, did it?
- A. We actually went a little bit further, we didn't formally interview them as in the normal interview process but Dave Bellett, our lead investigator, travelled to Australia and spent several days with AMPControl
- 30 discussing the whole monitoring system with them to gain obviously a deeper understanding of how that worked.
- Q. But there's no transcript of an interview, is that right?

A. No, no.

Q. And just one other matter, Your Honour I believe that the contraband rules presentation that they showed earlier, there's still a technical issue with getting the summation number so I don't have that, I wonder if I should just have it produced as an exhibit if I can so to ensure that that piece of the record is clear, so if I could produce that as exhibit 51 please.

EXHIBIT 51 PRODUCED – CONTRABAND SIGN

Q. Now, Ms Basher if I could ask for you to pull up the contraband sign photo that's at 0397, and Mr Murray, just by clarification this is an image that was contained in the booklet of photos taken by the police at the mine site and produced to the Commission during phase two of the Commission's inquiry. I just wanted to confirm that this photograph is consistent with your evidence around miners and people working underground at Pike, seen or being having signs available to them reiterating that no contraband was permitted underground at Pike's mine?

A. In terms of signage, yes.

Q. Do you have an understanding Mr Murray that this is a sign actually taken, the photograph is of the sign taken just outside the portal?

A. I'm quite happy to accept that, yeah.

Q. Just on the photographs too, it's not clear that they were entered, the booklet was entered as an exhibit during phase two so just in an abundance of caution if I could ask perhaps that this photograph be entered as exhibit 52.

EXHIBIT 52 PRODUCED – PHOTOGRAPH OF WORKPLACE SAFETY SIGN

Q. Now, random searches for contraband were conducted at Pike, weren't they?

A. I believe some were done, yes.

Q. And those searches, the Department of Labour found in its investigation were required by senior management?

A. The company did conduct random searches.

Q. And forms were completed following the searches so as to record that they had occurred, right?

A. Yes, I believe so.

5 Q. And the Department of Labour found during its investigation that 82 contraband searches had been conducted at Pike since April 2010, right?

A. Yes.

Q. So about 12 searches a month?

A. On average I guess, yes.

10 Q. And senior management at the mine had posted advisory statements and newsflashes reminding underground workers of the hazard of taking for example smoking materials underground, right?

A. Yes, I believe so.

15 Q. I'd just like to show you just a couple of examples of those Mr Murray. Ms Basher if we could please pull up DOA.001.08773. Mr Murray, do you recognise this document as a general newsflash dated in 2009 concerning the instant title, "Contraband in the underground mine working areas?"

A. Yes.

20 1407

Q. And would you agree with me that this newsflash relates to a finding in May of 2009, sorry, in January 2009 that was reported around a week later?

A. That's what it appears to be from the document yes.

25 Q. And just for the sake of completeness, in the incident description this is a newsflash that has been circulated by the safety and training manager, I'm quoting from the document, quote, "This is really unfortunate and disappointing as well as being something that rarely if ever you hear about or see in a coal mine. Regrettably, cigarette butts have been found in the underground mine workings in the pit bottom
30 area. You have all been trained, you have all been through the inductions, you are all aware of the mine manager's rules and you know we have gas underground. This is something that every underground

employee and/or contractor needs to be aware of. Simply because the person or persons participating in this unsafe act are putting your life at risk." You see that there Mr Murray?

A. Yes.

5 Q. And the way this newsflash is written the actions that are going to be taken at the site include toolbox talks being given and random contraband searches being conducted right?

A. Yes.

Q. If I could just take you to a second document, DAO.001.11364.

10 **WITNESS REFERRED TO DOCUMENT DAO.001.11364 – TOOLBOX TALK SAFETY ADVISORY NOTICE**

Q. This is, Mr Murray, a toolbox talk advisory notice dated March 31 2009, so several months after the document we've just looked at, do you recognise this document as the type of toolbox talks that were made available to the department in the course of its investigation?

15

A. Yes.

Q. And if I could take you please to the second page of this document, do you see the heading, "Contraband underground?"

A. Yes I do.

20 Q. And Ms Basher if we could please just pull up the first three paragraphs of this toolbox advisory document. And if I could just read some of this Mr Murray, starting from the first paragraph, "The consequences of some unsafe acts can be catastrophic. This is the case with taking contraband underground. Pike River Coal Mine is a gassy mine and as such the risk from an explosion and fire is a very real possibility. Therefore, we have to have very strict rules of the taking of contraband items underground that could cause a spark or fire in the mine. Everyone's lives are at stake with the breach of these rules." And then in the next paragraph, Mr Murray, there's a description of some recent incidents at the mine isn't there?

25

30

A. Yes.

Q. And then in the last photograph, quote, just the first sentence, "All of these incidents highlight the extreme risk and potential for injury and

death if one of these acts had caused a fire or an ignition.” Mr Murray, in the course of the department’s investigation, the department found other toolbox advisories or statements that senior management had given to the workforce and contractors about the importance of not taking contraband underground didn't it?

5

A. Yes.

Q. If I could just bring you to one more document.

WITNESS REFERRED TO DOCUMENT DAO.001.11428 - TOOLBOX ADVISORY

10 Q. This is a toolbox advisory dated the 15th of December 2009, and Mr Murray, if I could just bring you to the second page please. And if we could just, Ms Basher, bring up the first paragraph please? And I'm reading from the document, Mr Murray, quote “There have now been numerous toolbox talks on the subject of contraband items being taken and found underground. The latest reported incident has been that of a plastic cigarette lighter found lying on the floor of heading E1-99.

15

1412

Q. No one in the vicinity at the time admitted ownership of the lighter.” Ms Basher, if we could just come to the last paragraph of this toolbox advisory please and pull that one out. And just the first sentence there, Mr Murray. Do you see where it reads, “All of the above items,” there's a list above, “of contraband could either produce or provide a spark that could act as an ignition source of provide additional fuel after ignition in an explosive,” and then the sentence drops off there. Do you see that Mr Murray?

25

A. Yes I do.

Q. Now this toolbox advisory that we're looking at was issued in December of 2009 and do you recall from your investigation, Mr Murray that Mr Peter Whittall was acting as the mine manager at the time that this advisory was issued?

30

A. Yes I believe so. Could you just relay the date of the previous one you showed me?

Q. Certainly. That's dated, the issue date, the date on the first page of that document is March 31, 2009 and then at the bottom where there's an issue date it's 4/6/2009?

A. Ta, yeah.

5 Q. Now, with those documents in mind, Mr Murray, in concluding its investigation the Department of Labour has been unable to rule out that the action or inaction of an individual working underground at Pike's mine on the 19th of November 2009 caused the explosion that day has it?

10 A. Yes.

Q. It hasn't been able to rule that out has it?

A. No, no. No, we obviously can't rule that out.

Q. It's possible that one of the men working in the mine that day may have mistakenly taken a contraband item underground isn't it?

15 A. It's possible but you'd have to question the effectiveness of both the toolbox meetings and the company's systems if two years after these were written they were still having issues with contraband.

Q. It's possible isn't it Mr Murray that one of the men working in the mine on the 19th of November 2010 knowingly violated the rules set by Pike and its senior management prohibiting contraband from being taken underground, right?

20

A. It's always possible that individuals can go against rules of companies, yes.

Q. And it's equally possible that someone working on an earlier shift underground at Pike had mistakenly or perhaps knowingly taken contraband underground and left it there isn't it?

25

A. (no audible answer 14:14:46)

Q. Now if anyone underground on the 19th of November 2010 had in violation of company rules set by senior management lit a cigarette or used a cigarette lighter for another purpose, that action could have provided an ignition source for the explosion couldn't it?

30

A. It could have.

THE COMMISSION ADDRESSES MS SHORTALL – LINE OF QUESTIONING

1417

CROSS-EXAMINATION CONTINUES: MS SHORTALL

- 5 Q. I just want to take one more example, the one I just put to the Commissioners, Mr Murray. The issue with taking aluminium cans underground is that they can cause a high temperature spark if struck with sufficient force by rusty steel, right?
- A. Correct.
- 10 Q. And you're familiar as a result of the Department of Labour's investigation with the process whereby men working underground at Pike used roof bolts to secure roadway roofs as the mine was being developed, right?
- A. Yes.
- 15 Q. And there are a large number of roof bolts underground in Pike's mine weren't there?
- A. Yes.
- Q. And the Department of Labour has not been able to rule out in the course of its investigation the possibility of say a loader driving over a pile of unused roof bolts into which, say, a V or a Coke can had been discarded even accidentally thus potentially creating a spark for an explosion, right?
- 20 A. (no audible answer 14:18:15)
- Q. Now in the course of its investigation into what might have caused the explosion on the 19th of November 2010, Department of Labour investigators were told by men who'd worked as employees or contractors at Pike about instances of safety features being overridden by underground workers, by for example, fresh air from compressed air pipes or Venturi fans being blown over sensors, right?
- 25 A. Correct.
- 30 A. Correct.

Q. And the Department of Labour did not find in its investigation that any of Pike's directors or officers had been made aware of that type of behaviour underground did it?

A. Not directly. The investigation didn't find that directly.

5 Q. Likewise to the extent that investigators were told that men working underground had on occasion placed plastic bags or tape over gas sensors. The Department of Labour did not find in its investigation that any of Pike's directors or officers knew about that kind of behaviour either did it?

10 A. Correct, which in itself is interesting.

Q. Sorry?

A. Which in itself is interesting in terms of the systems process.

Q. Well rather, the men who described these types of behaviours in their interviews also described individuals not wanting to be caught by senior people engaged in such behaviour, didn't they?

15 A. I don't recall specifics like as in that specific.

Q. Are you familiar with the evidence of Neville Rockhouse given to the Commission? I think you said earlier that you?

A. I didn't follow of the evidence in detail, but I have an overview of Neville's evidence.

20 Q. I just have one question regarding something that Mr Rockhouse put before the Commission in December. He described having heard that underground workers may have used explosives to blow up bags of stone dust underground at the mine, and just for the Commission's benefit that's at transcript TRAN0003.2/417352 and 54. The Department of Labour, Mr Murray, in the course of its investigation didn't find evidence of bad behaviour occurring underground at Pike did it?

A. No.

30 Q. Now I'd just like to touch on one final limitation of the Department of Labour's findings as to cause or potential contributing factors to the explosion, and you've given evidence at section 30 of the Health and Safety in Employment Act empowers Department of Labour inspectors to carry out investigations like that done at Pike, right? But you didn't

mention that other sections of the Act also provide that the Department of Labour and its inspectors can be found liable for breaching the Act can't they?

A. Yes.

5 Q. In other words, the statute provides that the Department of Labour could investigate and even prosecute its own doesn't it?

A. Theoretically, certainly yes it does.

10 Q. And in response to questions that Mr Hampton put to you earlier, you accepted that the department has not investigated whether any action or inaction on the part of its own mines inspectors contributed to any potential causes of the explosion on the 19th of November 2010 beyond the work done by Mr Gunningham and Mr Neal, right?

A. Correct.

15 Q. But you would accept wouldn't you, that nowhere in the terms of reference that Mr Gunningham and Mr Neal provide in their report, were they asked to investigate whether any action or inaction on the part of the department's own mines inspectors contributed to the explosion on the 19th of November 2010, wouldn't you?

1422

20 A. Well, I can't comment on their terms of reference, that was done totally independently of the investigation that I'm heading and quite rightly so and so I had nothing to do with that investigation and kept separate from it.

Q. So you don't know what their terms of reference were?

25 A. I don't know what their exact terms of reference are no.

30 Q. I'll let them speak for themselves and just move on. So, to the extent the Commission was to place any weight on the Department of Labour's investigation report in connection with attempting to determine the cause of the explosion in November 2010, one piece of the puzzle, the part involving the mines inspectors, would not be covered in that report, right?

A. Could you clarify what you mean by, "A piece of the puzzle"?

- Q. Well, to the extent that the Commission was to place weight on the department's investigative report, into causes or potential causes, possible causes of the explosion on the 19th of November, I just want to be clear on this, action or inaction on the part of the Department of Labour's own mines inspectors is not covered in that report is it?
- 5
- A. Yes. It's not covered in the report, no.
- Q. Now, you described in your earlier evidence that the department and police conducted, at least in part, a joint investigation, right?
- 10
- A. Well, a parallel investigation but sharing information et cetera.
- Q. Well, you would agree with me wouldn't you that police and department investigators attended nearly all of the interviews that were conducted as part of their parallel investigations jointly didn't they?
- A. Yes they did.
- 15
- Q. But Department of Labour investigators did not attend the interviews of the two mines inspectors who had primary interactions with Pike did they?
- A. No.
- Q. No. So there was no Department of Labour inspector at the interview of Mr Firmin or Mr Poynter was there?
- 20
- A. No, no.
- Q. Now, do you recall from the evidence given by Mr Firmin and Mr Poynter to this Commission that on some visits to Pike's mine they were accompanied by other specialist inspectors?
- 25
- A. No I don't, I don't recall that.
- Q. Do you have an understanding that at times electricians and hazardous substance experts attended?
- A. I'm quite happy to accept that that would be the case yes.
- Q. And the Department of Labour inspectors didn't interview those specialist inspectors as part of their inquiry into the Pike explosion did they?
- 30
- A. No, not they didn't.

Q. Now, you would agree with me, wouldn't you, that the Department of Labour is supposed to conduct fair and impartial investigations?

A. Yes.

5 Q. And that the impartiality of an investigator could be affected if he or she had had regulatory oversight of the workplace in which an accident subsequently occurred, right?

A. Well, to the extent that – that was one of the reasons that we kept Mr Poynter and Mr Firmin out of the investigation but it would depend on the degree of regulatory oversight or interaction I guess.

10 Q. Well, I'd like to ask about that specific point, you've accepted in response to questions from Mr Hampton that Mr Firmin attended at least two interviews of Pike employees didn't he before he was interviewed by the police as part of the inquiries into possible causes of the explosion on the 19th of November 2010?

15 A. Yes and that was to assist with subject matter knowledge early in the investigation and we were building a picture.

Q. Well, he asked questions during interviews didn't he?

A. He wasn't the interviewer. I wasn't present in the interview so I – he certainly wasn't the interviewer, the interviews were conducted by a police investigator and one of the investigation team. He may have asked a clarification question but he did not conduct the interview.

20 Q. Well, without going into this any further, I'll just draw the Commission's attention to a transcript that has been made available to the Commission. For the record it's at INV.03.02458 page 8. Now, just turning to Mr Poynter, you said earlier in response to questions from Mr Hampton that the mines inspectors as you recalled had sat in on early interviews, right?

A. Not all of the early interviews but some of them. Very few really.

30 Q. Well, Mr Poynter attended at least 18 interviews from January through May 2011, didn't he?

A. Yes and they were selected interviews where we felt that his experience and clarification would be useful.

Q. And during those interviews Mr Poynter made comments and he asked questions of the interviewees didn't he?

A. Yes, eventually.

5 Q. And the department also used, as part of its investigation, it's resulted in the investigative report that's now been put before the Commission, another investigator who was later himself interviewed as part of the Department of Labour's own investigation, didn't it?

1427

A. Sorry, I'm –

10 Q. Well, are you aware that George Colligan attended an interview on behalf of the Department of Labour two months before he himself was interviewed?

A. Actually I don't recall that.

15 Q. Does it help refresh your recollection at all to the extent that at the interview he attended Mr Colligan introduced himself, it's on the record, as a senior health and safety officer for the Department of Labour when he was actually subsequently interviewed as the safety and training service provider to Pike River Coal?

20 A. I find it bizarre that he'd identify himself as a health and safety officer for the Department of Labour. I don't actually even recall the interview or him being involved to be quite honest.

Q. Well, again I'll let the record speak for itself on that.

A. Yeah.

25 Q. Just one final clarification matter Mr Murray. You were asked some questions from Mr Hampton about early interviews that were undertaken at which company lawyers attended and I think in fairness to Bell Gully I'd like to clarify with the Commission that you referred to Bell Gully, I think, you didn't recall the specifics but you mentioned that firm's name, I'll just clarify that it was Anderson Lloyd and Minter Ellis and my firm are
30 the lawyers that were involved. Do you recall that company lawyers attended those interviews at the request of company employees?

A. Yes I believe some of them did, because some of those employees didn't have legal representation and the offer was made by the company

to provide their lawyers and, as I explained to Mr Hampton, well, I didn't explain that to Mr Hampton because it wasn't the focus of his question, but the – and some of them were accepting of that but we made it quite clear to them that their interests may not be the company's interests which was stated and given the opportunity to proceed with the counsel in the room or not.

5

Q. And did the department, just in fairness to round out Mr Hampton's questions, did the department consider whether the presence of union lawyers or representatives at early interviews might have been intimidating to interviewees?

10

A. Well, they were largely done at the request of predominantly the mining staff who were in the union so I don't recall any of them appearing to be intimidated by that.

Q. Or do you recall at least one interview being conducted by the police and Department of Labour that was actually – where there was no company lawyer present, where it was actually interrupted by the arrival of a union lawyer and the interviewee said that he didn't want a union lawyer present?

15

A. I don't recall that exact instance but I'm quite happy to accept that could've been the case, there was a number of rather loud altercations in our offices between the EPMU's lawyers and the company's lawyers.

20

RE-EXAMINATION: MS MCDONALD - NIL

QUESTIONS FROM COMMISSIONER BELL:

Q. Mr Murray, I've just got one question. Based on your experience in this exercise is there anything you'd do differently if something, God forbid, happens again along these lines? Are there any learnings you can put to the Commission to tell us how you would do it differently, the investigation?

25

A. Sir, I think this investigation, obviously the major limiting factor was lack of access to a scene early on, at all as it turned out and I have given that question some thought. There may be some minor stuff but we were very much at the mercy of the conditions at the time so it was very

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much conducting early interviews in the full knowledge that we weren't going to have the total picture so we were going to be speaking to people about things that were happening at the mine and trying to get a picture of the mine without any background, real background knowledge of what was going on, so we actually had to proceed and also the other fact was that a lot of the miners were actually moving out of town so time was of the essence to try and get hold of some of those people before they disappeared. So, that necessitated some of the ordering of interviews perhaps wasn't what you would ideally like in terms of building up a picture and that necessitated to sort of revisiting some areas. I felt that we did the best we could. In terms of securing expert witnesses we secured them as early as we could.

1432

A. In all honesty I can't think of a lot that we would have done differently given the same circumstances. I found it very difficult in the first couple of weeks in setting up the investigation to try and build up the logistics of cranking up an investigation of the size, building up relationships with the police. It was very clear that the police were approaching this as a homicide-style investigation and hence their CIB team, and it was very clear to me that we had to be on board in terms of getting our act together as an investigation team or they were going to just carry on rolling, and obviously they had the systems and processes to do that quite quickly because it's something they do on a regular basis, so we had to be quite agile in gaining alignment with them. I was cognisant of the fact, though, that there was the potential for evidence at the mine to be lost during that early phase, but in discussion with the police there was very little we could do about it. We didn't want to be seen to be hindering the rescue recovery efforts by sort of traipsing in the middle of it all and starting to seize evidence and so there was a, I guess a potential conflict there. I don't know how I would address that if it happened again. I'd be faced with the same difficulties I think.

QUESTIONS FROM COMMISSIONER HENRY:

Q. My question, Mr Murray, is about variable speed drives, not a technical question. We've heard that there may be these VSDs as they call them, maybe implicated in some way. Has the Department of Labour issued
5 any warnings about VSDs to the industry?

A. Yes sir. We sent letters out to the industry. It was difficult in terms of the, at the time of the report the contents of the report wasn't publicly available so we were quite aware from a communications perspective that we didn't want the media getting a hold of a bulletin and then
10 putting two and two together and coming up with five in terms of what the report may contain, but obviously we wanted to get out to the industry that there was an issue, a potential issue with VSD. So the approach we took was rather than just issue a public bulletin, was to write to companies such as Solid Energy and others, and also to the
15 Australian regulators with a reasonably general letter indicating that there was concerns about this that needed to be looked into. As it happened, I got a reply after I sent it from Gavin Taylor who was still in Queensland at the time, alerting to the fact that the New South Wales regulator had that very week issued a bulletin in relation to VSDs in a
20 slightly different circumstance. It was more around vehicles I believe, but that the issue was becoming live within the industry at the time.

Q. Did you issue any recommendations in your letter?

A. Well the recommendations we were – we didn't issue any formal recommendations but we issued some general information that they
25 should consult electrical engineers around the issues.

QUESTIONS FROM THE COMMISSION:

Q. Mr Murray, just one practical issue.

A. Yes sir.

Q. In answering one of Mr Davidson's questions you were taken to the
30 report and also to one of the mine plans, and you identified a particular cross-cut in relation to the stopping adjacent to the hydro-panel entrances, and it was identified as cross-cut three and four one west.

Now I at least are not privy to the system that is being used throughout the report to identify locations within the mine using those sort of descriptions?

A. Yes sir.

5 Q. What is the system? Where is it to be found?

A. Sir, Mr Reece will probably answer this in his evidence because the system's based on the mine's plans themselves and that's what they refer to.

Q. Yes I appreciate that.

10 A. So we just felt we'd be consistent with the way that the mine described where the cross-cuts were and around the general orientation, compass orientations of the cross-cuts to general.

Q. So is there a Pike Mine plan which is devoted to this subject of identifying in the various headings the cross-cuts and the like by
15 number?

A. There is a mine plan which I believe has the cross-cut, has got the numbers on them, on the plan itself.

1437

QUESTIONS ARISING: MS MCDONALD

20 Q. Mr Murray I'll just get you to confirm for the purposes of clarification really, that subject to any health – subject to the department's health and safety oversight, the decision about re-entry is a decision for the receiver and not the department, is that the position?

A. Yeah, oh, yes certainly, it's not a decision for the department it is
25 definitely – it's the receiver's mine it's up to them.

WITNESS EXCUSED

MR MANDER CALLS**DAVID HAROLD REECE (SWORN)**

Q. Yes Mr Reece, can you state your full name to the Commission please?

A. Yes, it's David Harold Reece.

5 Q. And you are a mine safety consultant based in Australia, is that correct?

A. That's correct in Brisbane, yes.

Q. And as I understand the position you're the principal consultant at the Safety Managers Pty Ltd a company that provides safety training, audit and risk management consultancy to the mining industry?

10 A. That's correct.

Q. Now if you just briefly outline to the Commission your qualifications please?

A. Yes, qualifications wise I have a bachelor of engineering in mining, a graduate certificate in risk management, mine manager's certificate of competency, undermanager's certificate of competency.

15

Q. Prior to taking up your position at Safety Managers Limited, were you employed as the general manager of health, safety, environment and training at Roche Mining in Australia?

A. Yes I was, yep.

20 1440

Q. And prior to that were you for some three years a senior inspector of mines, coal, in the Queensland department of natural resources mines and energy?

A. Yes I was, yes.

25 Q. While as a senior inspector did you also hold various positions on certain panels and boards?

A. Yes, yes, do you want me to go through those?

Q. Could you please?

A. Yes. I was the chairman of the coal mine statutory qualification panel, that examines people for their statutory coalmining qualifications. A member of the steering committee for the national coal training package that establishes and reviews training within the industry and an auditor

30

of the Queensland Mines Rescue Service and acted as relief chief inspector of coal mines.

Q. Prior to you taking up your position as a senior inspector did you have a long history of employment as a mine manager in coal mines?

5 A. Yes, I had a number of years as mine manager in a number of mines.

Q. And can you detail for the Commission that history of employment?

A. Certainly, in 1998 to 2002, I was mine manager at Dartbrook Colliery in the Hunter Valley for Anglo Coal and a little bit of background it was a high gas mine, carbon dioxide being the gas rather than methane, with a high propensity for spontaneous combustion. As a longwall mine. 1996 to '98 I was a mine manager at Central Colliery in central Queensland. A high methane content, longwall mine. In '94 to '96 I was the mine manager at North Goonyella coal mine in central Queensland which is medium gas methane with medium propensity for spontaneous combustion. Again, a longwall mine. Prior to that, do you want me to keep going?

Q. Yes please.

A. Prior to that in 1977 to '94 and I haven't gone through all the positions there but I worked as a miner up to the ranks of gaining various qualifications with BHP.

Q. And are you the vice president of the Mine Manager's Association of Australia and have you been a panel member of the Mine Manager's Competency Committee and an examiner for the Queensland Statutory Qualifications Panel?

25 A. That's correct. I'm currently vice president of the manager's association, the other positions are previous positions.

Q. Can you just confirm that a copy of your CV has been filed with the Commission, DOL300.015.0003?

A. Yes it has, yes.

30 Q. And for the purposes of this evidence and indeed the statement which you have filed with the Commission, you have read and agree to comply with the code of conduct for expert witnesses?

A. Yes I have yes.

Q. The statement of evidence that has just been referred to which has been filed with the Commission, can you confirm that you have a copy of that statement with you in the witness box?

A. Yes I do.

5 Q. And just for the record, that has been filed as DOL3000.150001. Now, as we've already heard today from Mr Reece [*sic*], you were engaged by the Department of Labour to provide an expert report into the explosion that took place on the 19th of November 2010?

A. That's correct, yes.

10 Q. And what was your role in terms of providing expert advice and preparing this report?

A. It was primarily to work with, liaise, co-ordinate a panel of selected experts in the field so other experts that were engaged, as has been touched on previously with Professor David Cliff, Dr David Bell, Tim Harvey and Tony Reczek primarily and to co-ordinate those with the objective of compiling a report to the Department of Labour and accessible for the New Zealand Police Service as well.

1445

20 Q. That report has been filed with the Commission, 111 page report which was originally annexed to the Department of Labour's investigative report. Your report's been filed under the number DOL.3000.130007 and the DOL report, DOL.3000.130010. Now, what was your approach to your brief as an expert in terms of accessing information and organising or utilising the services of these various experts?

25 A. Well, the first instance was obviously to get access to the information or information that was relevant and available to us and that was provided primarily in documentary, in documents from the Department of Labour and the police service. Primarily it contained in the first instance reports from the mine, inspection reports, logs, technical reports, feasibility studies, incident report audits and then later statements from interviews, but as well as that there has been, that's been supplemented with
30 specific knowledge and information from each of the panel experts.

Q. Was this an iterative process whereby you would seek further information, follow up various topics in areas and provide and obtain more detailed data?

5 A. It certainly was and it happened on a couple of fronts if you like. As the information became available to the Department of Labour they certainly passed it on, as we reviewed it we were then in fairly consistent contact with them as far as other potential types of information that should be there, that they or the police either went looking for and similarly as their own processes were going through an iterative style as well, they were
10 finding things and passing it on so it was, there was quite an amount of going backwards and forwards, analysing, trying to understand and trying to, to some extent put forward or consider different options and variables and try and clarify as we went along.

Q. And just on that can you clarify for us what the purpose or the objectives
15 of the exercise that you were engaged to do?

A. Yep, our specific objectives were to determine what was the most probable cause of the explosion based on that evidence that was available, the adequacy or otherwise of the mine design in respect of management, management systems and to provide some
20 recommendations to prevent reoccurrence.

Q. Now, this was a collaborative exercise that you undertook with these other experts that you've referred to. Can you broadly outline the process by which the experts were drawn into this or drawn into the process?

25 A. Yeah, how the experts were drawn in, well, to some extent that's been touched on in previous evidence but it was a case of as we developed an understanding of what was happening it tended to indicate what type of person, what type of expertise we needed to get and then it was a case of attempting to access those people. You want me to go onto the way we then worked as far as a team and gathering information?
30

Q. Yes, did particular experts look at particular topics or did they consult with other experts, what was the process in terms of we've heard about modelling that was undertaken?

A. Yeah.

Q. That type of thing?

A. Yep, again it was on a couple of fronts, one was to get a general broad understanding of what had happened, and then to create a picture, to
5 look for more information.

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A. We tended to come together, work as a team and then go off into particular areas of our own specific knowledge and expertise. Develop that up to the point where we needed to come back again to test the
10 validity. That tended to be done with the Department of Labour personnel as well. We tended to do it as a group and then run to some extent challenge tests with the Department of Labour just to see how it fit with the investigation and the material that was there up to that point in time, and that happened a few times. There was some further access
15 to other aligned expertise. So, for instance, it's already been mentioned, but the further work that was done and coordinated between David Cliff, David Bell and Colin Ward to try and get some specific analysis of the rock and rock properties. Also with explosion modelling where WBM were consulted as far as providing further collaboration
20 confirmation of the modelling that had been done at that stage. Each of the experts either worked in the area of calculation based on the facts that were available and that we were relatively confident in, and then to some extent that was the case. Others use modelling based on the best known information that had been gathered. So, for instance, calculation
25 based on video evidence, modelling based on previous calculations that had occurred at the mine, so it was a range of models and calculations that were done as a result of that

Q. And you had the overarching responsibility of drawing all this work together and compiling or preparing a single report for the Department
30 of Labour and indeed for the police?

A. That's correct. So my role, and it's often the case, as a mine manager that you have generalist knowledge albeit trained in most of the specifics but not to the degree of detail. So it's a similar sort of a

function where you liaise with the experts, come up with the most plausible plan, and then work with those experts to come up with the most suitable approach based on best knowledge at the time. So it was a similar sort of approach. So my background, as I say, is a generalist but working across most of the areas of expertise.

5

Q. Now, you've prepared this report. Is there work that is still going on in terms of tweaking or re-examining various aspects of the report?

A. Most of it has been set up until it was submitted in October-November. There's a few minor corrections that need to be addressed, they're mainly typographical errors. But there's also some consideration given and some suggestion in recent weeks as far as broadening that expertise to consider some other variables and perceptions of what happened, so opportunity to further collaborate has been suggested.

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Q. We might touch upon aspects of that later. Mr Reece, was it possible to conclusively determine the cause of the explosion?

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A. Unfortunately not conclusively, and that's for two primary reasons. One is that obviously it's been said we don't have access to a scene to be able to develop more confidence in the information that we have available, and the second thing is related to that, the range of variables that we just had to come across. So whilst there has been some fairly strong attempt to try and limit the options, there are still many contributing factors that cannot be ruled out and that's the problem with being conclusive.

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25 Q. And in terms of what findings that you can make and in terms of what conclusions you feel comfortable in shedding more light upon what happened how would you describe where you reached?

A. It's very much based on attempting to get some feel for the balance of probabilities, so without being conclusive it's where we've been able to get to is what's most likely based on what we're seeing and what the story is coming out and trying to fit to some extent that analysis and those arguments with the quantum of evidence that we've actually got in front of us.

30

Q. So did your work take you down certain paths that caused you to focus on certain sets of circumstances that basically developed a strong possible scenario?

5 A. It did, and again that developed over time so there were particular aspects where we would explore particular logic. It was, to some extent it was a balance between not wanting to be too discriminating and discount things too early but by the same token not being distracted by things that were less remote. So, it was a case of looking at developing a number of options and in doing that we used fairly classic investigation
10 techniques to look at and try and give some structure to the logical things that could contribute and then attempt to either confirm or discount each one as we were looking for further information and looking through information.

Q. Now, turning to the explosion itself on 19 November, what are the basic prerequisites required to be present in order for an explosion to occur?

15 A. Sadly it's fairly simple in the sense that you need, as has been touched on, a fuel source, an ignition source and that in combination with oxygen, it actually needs to be in the right proportions and that'll be touched on as we go through but it's the combinations of those, so if you
20 have more or less of a particular element it changes the mix and the result, so in simple terms we're looking for fuel source, added explosive concentration and quantity mixed with the appropriate amount of oxygen and in contact with an ignition source.

Q. Now, you referred to the process of deduction and attached or annexed
25 to your report are a series of fault trees I think is how they're described. Could I ask Ms Basher if we could have up please the first of these fault trees, DOL.3000.150010. Mr Reece, could you just take us through this in terms of what diagrammatically is shown here?

30 A. Yes, just one point I'd like to make in clarification to start with, as far as the technique, it's called a fault tree in terms of these are the contributing factors if you like that have resulted in the particular event, it's not by any means to be construed as allocating fault which I have had happen with a previous confusion over the term.

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- 5 A. What we're looking for in using fault tree is to try and break down a single event, or a single instance into its varying contributing or potential contributing factors. So to go with that earlier comment as far as what needs to occur for an explosion to happen, we're looking for an ignition source and a fuel source which are the first two contributing factors in that diagram so it's starting from the top and working down just to give a little bit of understanding of how it's put together and see the underground explosion it goes through a funny looking arched symbol to 10 ignition source and fuel source. It's a specific symbol that's referred to as an, and gate, you need both of those things and this is the principle that we work on within a mining environment. Where you have something that needs to be combined with something else, if you take one of them out then it can't occur. So, that's significant in understanding the term. The second one is the other symbol that you'll 15 see underneath in ignition source and fuel source. It's a slightly different shaped symbol and that's referred to as an, or gate, so any one of those things could cause that to happen. And this is where, to some extent, we have some difficulty because if you eliminate one it doesn't mean that it's not going to happen. So it's a case of breaking each of those 20 causes and contributing factors down using some sort of logic and deduction from the experts, from knowledge of the conditions that we've got.
- 25 Q. We won't go into this in detail, but under ignition source you've got a list of, or set out diagrammatically there, a number of possible options?
- A. Yes.
- Q. Going under the fuel source, there's two options there that you've shown there?
- A. Yes.
- 30 Q. And further on you've shown the way in which that fuel source could have come about?
- A. That's correct.

Q. And in effect, in your evidence, you're going to be taking us through this diagram explaining in more detail how we arrive from perhaps the bottom line up to the ultimate conclusion of the underground explosion?

5 A. That's correct, yes, and some of those we didn't develop, some of them were discounted fairly early based on information. But we treat most of them.

Q. Now, in your written statement you have set out three scenarios which, as I understand it, are three of the most likely, or the three most likely scenarios working through that fault tree?

10 A. That's correct.

Q. Now I wonder if, Ms Basher, it hasn't got a number it's just a, that's it. Perhaps if we just focus on case one to start with?

A. Yes. Do you want me to step through that?

15 Q. Thank you. Just in general terms because we're going to come into this in more detail later on, but in general terms can you just show us the chain of events for case one.

A. The chain of events, and we've shown it in a direct sequence which may or may not be absolutely correct, there's potential for some paralleling up of that but the logic still remains in the sense that we need to have gas, we need to get gas from some location, we need to get that gas in the correct mix, if you like, to be at an explosive level and then we need to bring that into contact with some sort of ignition source. So, that case one is the one that we felt was the most likely event given the knowledge we had at the time.

25 Q. And can I ask to be brought up a map, DOL300.015.0023 please?

WITNESS REFERRED TO MAP DOL300.015.0023

1505

Q. Perhaps with reference to that map can you again just step us through in more detail this case 1 scenario?

30 A. Okay, what this is saying, to go through it block by block, is that we're saying that there was a gas build up in panel 1 goaf which is the only goaf area in the mine, that there was potential for a goaf fall in that area, so this is a natural phenomenon if you like as far as this style of mining,

then that goaf fall or the roof fall in that area has the potential to act as a piston in the cylinder and push anything in the atmosphere that's in there out through the – potentially down each of these roadways and that's not to negate that there isn't a ventilation circuit in here that we'll probably touch on later, but nevertheless it depends on the pressure that's developed there as to where and how that's going to transmit out of the panel. We're saying that potentially that pressure would've come straight down the return, potentially of it down the intake as well, a significant amount of concern with this particular ventilation control device here stopping in that roadway, that was not a substantial structure but potentially that goaf fall could knock over that stopping.

Q. Just pause there. So, you've indicated gas using a piston effect going down both A heading and B heading?

A. Yes.

Q. To panel 1?

A. Of panel 1, yes.

Q. Of panel 1 being pushed through into the cross-cut, cross-cut 3?

A. Yes.

Q. And having what effect on the ventilation device there?

A. Well, knock it over, to knock it over, disrupt it, you know, it's hard to say whether it would completely knock it over or just enough to breach.

Q. And the gas then goes where by reference to the map?

A. Well, the gas is naturally going to come down this return roadway that's already being ventilated by the ventilation system but potentially it also brings it into the main intake that's established there. There's some discussion to be had about the disruption to the ventilation system that that would cause and just where it would go, we'll touch on that as we go further.

Q. So the gas would head down, on this scenario, down the return, down C heading?

A. Yes.

Q. And also would come across cross-cut 3 and potentially may go inbye?

A. Yeah.

Q. Up B heading?

A. Yeah, and potentially some would be in this area as well, simply by the mode of force it'd go for.

5 Q. Now, again we'll get into more detail of this in terms of the ventilation system, so that's the fuel source if you like under this scenario?

A. Yeah.

Q. What of the ignition source in terms of this case 1 scenario?

10 A. Okay, one of the things, it was part of that fault tree, it was a case of looking at the available ignition sources if you like, but without going through all of them, there are a number of conditions that present themselves in that scenario. The concern has been raised as far as the VSDs, the electrical installations in the mine and the complications and the contribution that that makes to electrical systems and electrical installations and metallic installations. So, on that there's some
15 equipment that is around there, there's an auxiliary fan, electrical installation of an auxiliary fan right at that point.

Q. Can you describe that in reference to the map itself in terms of a label?

A. Sorry, it's one west three cut through again where that stopping is.

Q. Now, that's very broadly scenario one?

20 A. That's correct.

Q. I want to take you on to scenario two or case two, is that really a variation of case one?

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25 A. It is. Just, if I could. What we're saying is that this fan is not the only potential situation. There are other potential ignition sources in the vicinity as well, particularly if we take into account metallic installations, so pipes, cables start to become unfortunately something that we've got to include in the mix, so it's not just that fan. But under the second one, it's a similar sort of a situation but it's really extending it further into the
30 mine and saying if that gas was carried further in, there are other ignition sources in there such as auxiliary fan and I think it's six cross-cut and auxiliary fan four that are both up in the one west, the further areas of the one west part of the mine. Again, it's similar sorts of

ignition sources, but it also starts to impact on possible gas sources that are up in this area as well.

Q. That are being?

A. It's six cut through with one west or six cross-cut, sorry.

5 Q. And the gas would, again it's generated from the same mechanism, a goaf wall?

A. Well this, yes it's a potentially combination of goaf wall and disruption but also linking with gas that's potentially already up in this area.

Q. Now, case 3, can you just again generally take us through case 3?

10 A. Okay. Case 3 is excluding the goaf and it's primarily concerning this area of one west in the mine, so six cross-cut itself and B heading of I think it's two right, yep one west two right area. And they had been struggling in previous shifts with boreholes that had been intersected in this roadway.

15 Q. Is this where the ABM had been a problem?

A. Where the ABM machine is. So there had been some previous good shifts of mining in there, which is going to lead to more gas being released plus the intersection of borehole. So there'd been some challenging situations with gas in there and we raised the concerns with gas in six cross-cut, which is going to be as a direct result of gas in that roadway. Also potentially up in this what we'd call a stub. It's a dead-end. It's a relatively long stub to be in that area, potentially difficult to ventilate, so again it can be a source of stagnant methane if you like.

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Q. And that's a continuation of B heading?

25 A. That's correct it's a continuation of B heading one west inbye six cross-cut. And potentially also the area of A heading that was being back-driven as we would say by a roadheader also intersecting with a gas hole in that particular roadway. So there's a number of gas sources that we saw that would feed into this. That in combination with the angle of the seam. So it's all uphill, running uphill to this area or up dip as we would say, and because of the buoyancy factor of methane there's a natural tendency for it to gather in the higher areas in the higher parts of the roadway in the mine. Now that's not something that is unknown, it's

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not something that should happen. It's just a fact of where gas will go in certain circumstances. So that's to some extent the gas that we're looking at and where it's come from.

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5 A. Now, potentially that's been exacerbated by some sort of failure to the ventilation system in there. That's not absolute, it's not substantiated. There are some things that have been picked up in witness statements talking about having to repair the ventilation tubing in that area. It may or may not be contributing but then there becomes the issue of if there
10 is gas in that sort of a region, how does it come into contact with an ignition source. We have ignition sources up there in the form or, as I've said previously, auxiliary fans, electrical installations, potentially out as far as the main fan that we'll touch on later on when we get into the ignition sources as well. So that's essentially the third scenario.

15 Q. And on that third scenario you've mentioned it but it may have been just lost in some of the detail, there's an exposed borehole is there in the ABM panel?

A. Yes, there certainly is, there's a couple of boreholes actually. Well, it's essentially one borehole but split into a couple of branches so that
20 passes through, it had recently been intersected and that passes, and we have a plan later on, but it passes through there into what we call virgin areas of the coal seam. So areas that weren't mined that were essentially fresh coal.

Q. And do I understand these conditions lead to a potentially a build-up of
25 methane?

A. Well they can do, it's something that mining must manage. It's one of the main hazards in coalmining. In effect that's one of the key reasons that we have ventilation, there are a number of others, but we have ventilation to dilute gas, methane specifically sorry.

30 Q. Now, in respect of these three scenarios are any of them mutually exclusive?

A. Not really, and that's part of the issue. It could be individual, it could be combinations and indeed, you see in the second one that I didn't touch

on there are other aspects of ignition sources such as diesel vehicles that would need to be considered as well.

Q. So in all these scenarios, there's a build-up of methane?

A. Yes.

5 Q. Coming into contact with an ignition source?

A. Yes.

Q. And the most likely of which I think the experts are agreed upon is the electrical phenomena of harmonics?

A. Yes.

10 Q. Which could be present in any part of the mine where you have electrical installations or metallic pipelines?

A. Sadly yes but I'd have to clarify that in saying that we arrived at that point because of the coincident nature of the starting of the VSDs, not because it was necessarily the most likely or the only situation. There are a number of potential ignition sources that we considered as well that we haven't discounted but the coincident nature of that one made it fairly compelling.

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Q. You've also touched upon a possible scenario in your statement relating to the failure of the compressed air pipeline, could you just explain to us that and why really it's put to one side?

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A. Okay, it was put to us that, and this certainly came up early in the piece, that there is a certain amount of evidence, or hard information, primarily from two sources. One was the survivors and their eye witness statements and the other was calculations that were carried out on power sources, power disruption, compressed air disruption, so down in this area here, or indeed there's a fair bit of, to some extent, inaccuracy in determining the actual location.

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Q. In that area as well?

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30 A. Well, it's in the Spaghetti Junction area. There's information or calculation of compressed air pipeline failure, power failure and at the same time coupled with the eyewitness, one eyewitness statement of, sorry, survivor not necessarily eyewitness, but certainly survivor

statement of a white flash, so those particular points of information and the request was made to look at this particular area and what could've potentially happened. I guess you could certainly make a case for something to happen there. It could've been something hit the compressed air pipelines and the power lines, Spaghetti Junction to some extent is an unfortunate name and admission I think and there's a photo later on that we'll have a look at that just lays out the number of services that are in that area, that if – was for some reason impacted by a vehicle could do a couple of things. One is to release the compressed air into the area, the other is to disrupt the gas pipeline so potentially you've got a mix of fuel source, oxygen disruption giving some sort of turbulence that gives an explosive cloud. I go on further later on to look at some of the issues with that. There's not a lot of compressed air in real terms. It would be a frightening situation, it would give a person a big fright as far as what had happened there. The combination of compressed air and methane coming out of that pipeline, even if there was an ignition, is not seen to give the magnitude of explosion that's likely in this, that we're seeing from this, and secondly, if it was there there would be – it's expected if there was that sort of a cloud of methane in that area and that was the ignition source there would be significantly more heat felt by the survivors, if indeed they would've survived with that sort of heat, so there's a few things that took us away from that and really the reason for treatment was because there had been a significant amount of analysis and it was factual information that was provided. We felt obligated to at least look at it and give it some initial plausibility and just to examine how it would have occurred and what would have been the result.

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- 30 Q. Now is one of the starting points of your analysis and examination determining what type of explosion occurred in the coal mine?
- A. Well, looking again going down through the fuel sources, it was a case of deciding which of the fuels that it could potentially have been. Part of the initial determination of this was dependent on the actual size or the

magnitude of the shockwave and the potential explosion. That in itself starts to negate some of the potential fuel sources such as diesel fuel in tanks, the gas cylinders. They're the classic types of fuel that would potentially be in the mine. So the sheer size of the explosion starts to steer us away from those so we're pretty much back to gas or coal dust. Then it was a case of looking at determining whether it would have been coal dust or gas. That comes down to some chemistry that David Cliff has quite often utilised within mines to determine, and his assessment based on the chemistry albeit that the analysis was done somewhat after the fact, the analysis of the resulting gases from the ratios at least there tends to point to a gas explosion. That's also borne out to some extent by the magnitude and severity of the explosion and the damage that we're seeing as well. Dust explosions tend to be extremely violent, so...

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Q. And you've set out those gas ratios in your statement at paragraphs –

A. Those ratios are in there.

Q. Thirty one and 32?

A. Yeah, what's not in there is the actual numbers and that's actually in the full report and shown as scatter graphs if you like of each of those ratios, but the initial findings are that it was in the gas fuel side of the analysis. Later on you can actually see that it moves towards coal products rather than gas.

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Q. Was there any evidence of the presence of coal or coal dust being involved in the explosion?

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A. Well, we certainly looked at that and mainly with the products that were ejected from the mine, there was dust primarily that had been ejected from the shaft, not necessarily from the portal or the drift, that material was analysed. The assessment from that was saying that, yes, there was potential coking that had happened so it was subjected to heat, that was given to Professor Colin Wood to give some determination on there, but it came back, the degree of coking came back to indicate that if there had been any involvement of coal dust it was fairly minor, it was

only fairly weak, so it's potentially that that coke, or the coking of that dust was a result of, not as a contributor to the explosion, but again, it's hard to be definitive as far as that's concerned, it's been heat affected, it's hard to say whether it was due to or subsequent to.

5 Q. What would be the significance of any of the presence of coal dust in terms of the potential scenario?

A. Well, the main thing is that it's depending on how much is there, it could reduce the amount of gas that you need to have in the explosion. We've got the ratio there, about one kilogram of coal dust would replace
10 about one and a half cubic metres of methane, so it's still a fairly significant amount of coal dust that would need to be involved, but again, as I say, once you start getting large quantities of coal dust involved the violence of the explosion and the ratios start to change, or the violence of the explosion goes up significantly and the ratios start to
15 change.

Q. But the fundamental conclusion of the experts is this was a methane explosion?

A. That's correct.

COMMISSION ADJOURNS: 3.28 PM

20

COMMISSION RESUMES: 3.47 PM**EXAMINATION CONTINUES: MR MANDER**

5 Q. Just before the break you were going to go on to talk about the volume of the fuel source, the volume of the methane required to cause an explosion of this magnitude. Now, does the examination of the volume of methane help to determine the source of the fuel, where the fuel has come from within the mine?

10 A. Well, it assists. I suppose it was a case of working backwards from the information that we had and that information was the video footage of the shockwave at the portal or the mouth of the drift. So that's probably the only thing that we've got really that gives us some indication of the magnitude of the explosion and therefore back calculating some sort of volume of methane that would've been involved.

Q. And can you step us through that analysis?

15 A. Yes. Okay, the process was to take that video footage and quite simply to slow it down, to break it down to try and get some estimation of the duration which we measured at about 52 seconds from the start of the shockwave to the end in the sense of energy dissipation and it was difficult because if you can imagine, you don't have a marker to measure the velocity really. It's easy enough to get some sort of indication of the area so to measure the area of gas based on the shockwave we've got to consider the area of the roadway itself and then try and get some indication of the velocity of the wave that's travelling and if there's nothing in that air to use as a marker then we don't know
20 how much it is but in slowing it down there were items of debris that we could actually track across screen over set, well there's various frames that were recorded in the field of view, the measurement of the field of view of the camera to then estimate the velocity that the debris was travelling at. The problem then is that that piece of debris, once it's
25 gone, the marker is gone so we're then left to estimation. So, it's an estimate that the velocity was greater than 30 metres a second at some point. Certainly with that debris that's travelling, we don't know how
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long that that velocity continued for so I suppose to put it in perspective we don't anticipate that the velocity of the shockwave is a square wave, so what I'm saying is it's not a shockwave that goes immediately to 30 metres a second, stays at 30 metres a second and then stops after
5 52 seconds. It's going to be some sort of a wave, much the same as you'd see at the ocean where you've got a starting off, hits peak, and then tails off. But again, we don't know exactly what that's going to look like. So, based on that information the debris, the velocity that we could pick up from that, from there we're on to estimates.

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Q. The dimensions of the stone drift, that's a factor in the calculations?

A. It's a factor in the sense that that allows us to calculate volume so it's a simple multiplication of area by velocity to give total volume of the cloud of atmosphere or the amount of atmosphere that's pushed out of that
15 tunnel, so again it's to calculate that overall volume. We did do it within limits to upper and lower limits, so we're looking in the area of 30 to 70,000 cubic metres of total volume that's been moved. There's a couple of considerations then come into that, is that the drift is one outlet of the mine if you like, the shaft is the other, so there's potentially
20 two outlets for that explosion to be transferred or translated along so potentially there's this scope for doubling that volume, but again the mix and the proportion is debatable because we don't have any marker on the shaft, any idea of actually what's come out of the shaft. There is some indication based on the amount of damage, but again it's
25 photographic evidence so there is scope for calculation of some of the pressure there based on that damage. So, that gives a total volume. Then it's a case of working backwards from that based on explosion modelling, research that's been done into methane explosions and the expansion of methane due to an explosion, or expansion of methane
30 and other gases present, and there's a couple of factors there that we've used the factor of five times the atmospheric, the atmosphere that's there, five times that atmosphere in the expansion ratio, but it depends on, and you see the term there, it's documentary, really all

that's talking about is it depends on the mix of methane, the proportion of methane that's in the mix as to how much that will expand.

Q. So that's the expansion of the gas fuel as a result of the explosion?

5 A. Well (inaudible 15:54:51) is really the ideal explosive mix really, it's documented mix is the most explosive mix which for methane is about 9.8 percent, so it's really talking about what sort of proportion you've got as to what expansion you're going to get, so we don't know that absolutely, so working backwards from that, on that five times expansion ratio we're looking at the volume of mine atmosphere that would've expanded being about 12,000 to 28,000 cubic metres, and then considering the actual amount of methane then, so that 12,000 to 10 28,000 is talking about atmosphere that's expanded, the methane that would've been involved to cause that expansion is then calculated down as between 600, and it's actually a typo in the report, it should be 600 to 15 1400 cubic metres of methane at that sort of percent.

Q. That's at 5%?

A. At 5% or in excess, yeah. Now, that then, that's based on pure I suppose simple maths and calculations based on research upon understanding of gases, but then coupled with that is also consideration 20 of the products of combustion that you would get from that explosion, so when you get a fire and explosion of this nature you get carbon monoxide which is simply the combination of carbon in the methane and oxygen that's in the atmosphere, and it was then a case of looking at, well, what sort of impact again on the survivors to come up with some sort of understanding of the resulting gases that have come from that 25 explosion.

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A. So the conclusion primarily from David Cliff on this one was that it would be looking at a fuel-rich explosion so it's not 5%, it's significantly higher 30 than 5% to generate the volumes of carbon monoxide that seem to have impacted on the survivors, if that makes sense. So if there'd been very little carbon monoxide it would have been an indication that there was lower methane percentages. The fact that there was, the description of

some of their symptoms from their statements was tending to indicate that there was some carbon monoxide impact. So that then says well it's higher methane generating a certain amount of carbon monoxide.

5 Q. And the least amount that was concluded by Dr Cliff and the consensus of the experts?

A. Oh, we didn't actually come up with a number other than well it's obviously got to be block - it's got to be more than 5%, but hard to be definitive of what, and the issue with this is it's not going to be a homogenous mix of gas through the atmosphere. It could be all sorts of
10 percentages in different locations, depending on turbulence, ventilation characteristics, even disturbances in the air parts. So it's not going to be to some extent a stable environment that you're looking at.

Q. And in terms of volume, that takes you where as to the amount of fuel?

A. Yeah, the problem then becomes those numbers aren't insignificant as
15 a body of methane. It's not something that you could get anywhere just anywhere in the mine. So that started to push us towards particular locations where you could generate that sort of a body of methane, which is pointing towards the goaf and to a lesser extent the inbye areas of the development workings.

20 Q. Because those are the likely areas of the mine likely to generate that volume of methane as a result of some either accumulation or as a result of some event?

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A. Yeah. Either way it's an accumulation, but there are potentially different
25 styles of accumulation. The goaf because it's already an accumulation point. To a large extent you can't avoid it, simply because it's a cavity, it's an opening, it's not ventilated and we'll touch on that later on, so it's there, it's already a source. Getting it out becomes a challenge. It's not, there's only a few ways that that can happen. Elsewhere you can get
30 again accumulation pretty much dependent on two things. One is an extensive gas source, the other is in combination with ventilation so that you've got that potential for build-up of methane.

Q. I want to now return to the specifics of case one and two in particular.

A. Yes.

Q. But before we do that I'd just like you to explain to us this combination of methane and oxygen that's required and/or the range of the mixture that's required to produce an explosive fuel source.

5 **WITNESS REFERRED TO DOL300.015.0028**

Q. Now, Mr Reece, can you just explain to us what we're looking at here?

A. This is what's called a "Coward's Diagram" and it's called that because it was named after the gentleman that researched it and put it forward and what it describes is the possible mixtures of methane and methane
10 explosibility, indeed you can construct these sort of diagrams or triangles for any explosive gas, but this is one for methane. It's quite a common tool that's used in underground coal mines to understand the nature of gases, or nature of the methane that you've got available. There's a couple of things to just point out. We've got on the left hand
15 axis, the Y axis is oxygen and you can only get oxygen in a percentage from 0 to 21 or 20.93% and methane across the bottom, again, you can get methane in a percent from 0 to 100% indeed if you look at the seam gas from Pike River it was roughly, if you took just the gas out of the coal, it was roughly 98% methane, it was, there was a little bit of carbon
20 dioxide mixed in with it as well. Bear in mind, that's not everywhere that's just if you take the gas out of that coal, that's the proportions that you find in it. When we talk about, and there's been a lot of talk, people have been talking about methane as explosive from five to 15%, 5% is the lower explosive limit at this percentage of oxygen. If you reduce the
25 oxygen you actually increase the amount of methane to what's called the nose point where that can be explosive so it's actually in the red triangle here that methane is explosive. The upper explosive limit is 15%, so if you look down there it's 15%, but again, it's at that sort of range of oxygen. The other areas, and this is probably something I
30 wanted to make a point of, because and I don't know what has transpired here but certainly some of the conversations that I've had with some of the investigators, it talks about these other zones and people are talking about once you get above 15% into this area, the

atmosphere's inert. You need to be really careful with that. It's not inert, it's fuel rich. So it can't explode if it stays there but if oxygen is increased then it actually pushes the explosibility back into this explosive area so it's only inert in the sense that there's so much fuel there that it can't explode. Not because it can't explode.

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1605

Q. And you're referring there to the round portion of the diagram to the right of the red triangle?

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A. That's correct. The little bit up in here, as it says, it's fuel lean, it's low fuel, it's less than 5% so we really look at that and say, well, if there's more methane added then you push it into that area. Okay, now there's a couple of things that we use this for, one is in a mined out area, a worked out area of a mine that may be sealed if it's a gassy mine, we try and keep the methane up high, we seal it off so that oxygen can't get in there so you're actually excluding oxygen so you can't get a flammable or a very explosive mix, and the working area, you're in this area though, you can't, you're not looking to exclude oxygen.

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Q. In reference to the working area are you referring to the brown portion to the left of the red triangle?

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A. Yeah, the fuel lean zone, part of the triangle.

Q. Thank you for that. Now, also just as perhaps a more fundamental basic factor before we go on to look at cases 1 and 2, Ms Basher could we also have up a diagram, DOL.3000150029 please. Now, the diagram that has been put up is entitled, "Simple Ventilation Model," and can you explain to us how this represents or what it represents in terms of a description or how ventilation is supposed to work?

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A. Okay, this does two things. It provides us with a schematic model of ventilation of a mine and it also provides some sort of understanding of how we go about modelling ventilation in a mine. It's a very simple circuit in this instance, but to a large extent this is very similar to Pike River, and indeed most of the time when we do modelling, ventilation modelling we collapse it down to this sort of a picture if you like, even though we'll look at some of the actual pictures of ventilation modelling

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later on, and even though it looks complicated it's not actually a lot more than this. What this is showing, and this is how ventilation works, ventilation is one of the key aspects or factors that you need in underground coalmining, primarily so people can breathe, the air just doesn't naturally want to go into a mine, so you have to create ventilation for people to breathe, to remove gas, to remove dust, to remove heat, to make it a generally, as far as practicable, hospitable area for people to be in. So, what we're looking at with ventilation is we need a way for the air to get in, a way for the air to get out and what this is showing is a simple circuit of air passing through a mine. Now, this is shown as a downcast or an intake shaft and an up-cast or a return shaft, it doesn't have to be that, there's a whole lot of different options as to how you get in and out of the mine, so this is essentially surface, surface and this is down a shaft into the mine, so this is underground, however you've got there, there must be –

Q. – and for Pike, if I can just interrupt, for Pike you would substitute the downcast shaft with the drift?

A. That's correct, yep, so that would be represented as a flat roadway heading out there or, so from there we need a circuit intake across a working area of the mine into a return, generally there's some sort of what we would call a regulator but it's a resistance or a restriction to try and control the amount of air that goes through that roadway and then its drawn up the shaft or out of the roadway, whatever it is, through a fan so the fan sucks or exhausts the air out of that. So, that fan provides all the mode of force for the air to go around the mine, whatever direction you choose to make it go. So, it's shown.

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A. There's also a roadway going up here, another intake going up here, across a working area and out of the mine, and another one that actually branches off or splits off here and goes up around this working area back into the return and out of the mine. So there's, in effect, three working areas that are operating in this diagram. How we separate, and it's important we need to realise that we need to separate the intake air,

the good air, from the return air, the bad air. So this is fresh air intended to be less than 1/4% methane. There's limitations on just how much gas you can have in that intake roadway for people's health and wellbeing. So the intent is good fresh air goes into the working place.

5 Anything that's generated from the mining process in here is picked up in the return air and discharged quite separately down another roadway that people don't frequent. That's not to say they don't go in there. It's generally the normal coal mine worker does not go into that area except under more controlled inspections and methods of working. A couple of

10 other things to work out that I presume has been touched on but I'll reinforce it. There's stoppings or barriers between the intake and the return. It could be simply a wall that's built. It could be doors that are installed so that you can actually get people or equipment through the doors. We normally have two doors, double doors. They're

15 represented as a big D and they're set up so that they swing out like double doors. There's two so that you can create an air lock. So if you open one door there's still a barrier up there so you don't short circuit the air. The reason for that is so that you can get equipment in there. So it can take a little while to get equipment through. You need enough

20 space between the doors to get pieces of equipment in there so that they can actually go in and work in this area of the mine. The other thing to point out is the air crossing or overcast. Again, we need to keep these roadways or the airways separate so we build in air crossing that's in effect one roadway going over the top or underneath another,

25 and they're separated by, if you like, a horizontal wall or a fixed barrier that just separates the two. And that's purely so that you can have different circuits in the mine. So you'll see that there's an air circuit there and an air circuit there all fed off the same fresh air or intake. So they split at that point. Some air goes that way, some air goes this way,

30 through the working area, and they both join again back at this point and return up the shaft, okay?

Q. Now, could we have up please Ms Basher the map, DOL300.015.0023.

WITNESS REFERRED TO MAP DOL.300.015.0023

Q. I'd like now to turn to Case 1 if you like, the Panel 1, the goaf area. Is it possible, Ms Basher to blow the map up a little bit, focusing on the upper left area of the map. Now as I understand it, you have identified the Panel 1, the goaf area, as the most likely source of methane given the required volume. Any other factors that bear on that?

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A. There are a few things that we'll touch on as we go in there. It is certainly an area where you could get a large volume of methane. Some of the other considerations are that there had been goaf falls in that area relatively recently and had generated significant volumes of methane out of that roadway into the return. The other thing is that particular fall as it occurred, knocked out this stopping here, is our understanding from looking at the information. So there'd already been the motive force and the gas reservoir if you like in that area.

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Q. So just pause there, now you're referring now to an incident or an event on the 17th of November is that right?

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A. October I think, no, no, the 17th of November was actually, I think is when they flushed the gas out, so I'm talking about earlier in October when the goaf fell. .

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Q. I'm sorry, this was an earlier fall in October 2010.

A. So that's one instance.

THE COMMISSION ADDRESSES MR MANDER – CLARIFICATION OF DATE

EXAMINATION CONTINUES: MR MANDER

Q. Yes, Mr Wilding's indicating the 30th.

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A. Yes, the other event that you're talking about on the 17th is a situation that we took note of when, I suppose a couple of pieces of evidence coalesced where there was a re-starting of the hydro-miner monitor in the panel and quite simply sweeping this area of the goaf with the water jet, flushed in the order of 1500 cubic metres of methane out of that panel and into the return. That was a combination of the actions that happened in the panel, the deputies production reports and the

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monitoring of the shaft which we'll probably touch on shortly as well. So, the monitoring of the shaft shows that as a spike of methane but when you actually go back in and calculate the total volume of methane underneath that spike, if you like, it equates to about 1500 cubic metres of gas, at about the 5%.

WITNESS REFERRED TO DOL300.015.0011

Q. Perhaps if we just blow up the bottom diagram? And that's showing us what?

A. Well that's a schematic expansional blow-up of the actual goaf area based on last known dimensions and assessments of that goaf area so this is largely the cavity that's there. This is an indication of the hydro-monitor itself. It's an indication that there's going to be gas of high percentage up in this area but there's also a fringe where it transitions from high percentages down to low percentages. This is the area that the hydro-monitor was working, was actually working there cutting coal or aiming to excavate coal from that particular area, but it's also indicating just a, again, a schematic indication of the turbulence that would've resulted from the use of the hydro-monitor in that particular area. It's potentially not happened on the day at the time of the explosion because our information is that the hydro-monitor wasn't working but when the hydro-monitor is working it will stir up this gas cloud and coupled with the ventilation that's created in here will draw methane out into this roadway and in effect that's what happened on the 17th of November.

Q. Now that area, that orange area in the diagram, that is methane?

A. Yes.

Q. And the cavity of the goaf is such as shown in the diagram that it can hold an extremely large amount of methane?

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A. Yeah, so if you like, just to put a description on it, it's not as if this is just a big opening that's void, to put it in perspective the seam is roughly nine to 10 metres, these roadways are only three and a half metres or so high, five to six metres wide so they're nowhere near the size, or the

full thickness of the seam. The aim of the mining process is to take as much of that seam as possible so to take up to nine or 10 metres, but it doesn't just sit open, you don't have a 10 metre opening that's happily sitting there as a void, that the gas will bleed into and fill. The area will collapse, it can't, generally in these sort of situations it can't self-support, some types of rock you can, not this type of rock, some very strong sandstones, massive sandstones in conglomerates you can get it to bridge all the way across there and not cave. This particular strata doesn't do that so there's, the rock that's left above the seam that's been extracted will by nature break and fall in and collapse so what you would have in here is big piles of broken rock as well as the cavity that's actually because of that up higher than 10 metres, so it's not just the seam that's the cavity, it's actually potentially above it and that becomes an open area where methane and other gases just sit, just by their nature the fact that it's not ventilated, it would just accumulate in here, up high due to the buoyant nature of methane.

Q. Now, in addition to that is it also correct that there was a borehole present in the goaf area?

A. Okay, it probably begs the question before I go there as to where the methane comes from, well, there's still coal seam all the way round here so this is still in a very large seam, so –

Q. You're indicating the boundary of the goaf?

A. The boundary of the goaf, the seam doesn't stop there, it just keeps going so you have a natural bleeding of gas that is in the coal here into the roadways. You have gas that's released from the actual mining process as the coal is cut into this area and as well as that there is a borehole, it's indicated as a borehole, it's gas borehole 13 I think, that actually splits and branches and goes through the top end and indeed the bottom area of this panel, and that continues on for some couple of hundred metres I think past that. Now, at the time that the borehole was installed and we talk about this later, but it's for the purposes of exploration and understanding where the seam is, and ultimately becomes a gas feeder for the, into the gas drainage pipeline or in effect

into the mine workings, it has to be controlled. The intent as far as I can make out and understand is that those boreholes were under intended to be under these roadways. That's fine for those roadways because they are a couple of metres above the base of the seam if you like, so there's a couple of metres of coal underneath those roadways which is the target area for these boreholes, but they don't always stay there, sometimes they do go to the top of the seam but to a large extent it's actually irrelevant in here because the intent has been to take out the whole seam, so those boreholes would've been exposed to this goaf so they would've been feeding that as well. It's potentially not a big issue, it's just another feeder of methane into that area.

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Q. Have a look at DOL.300.0150025 please Ms Basher. If you just point out to us the borehole that is intercepting with the goaf area?

A. Okay so just to put it back in perspective the goaf area there, this is the borehole that I'm talking about that comes from down – there's a little stub there, it must be 11 actually. So it's -

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Q. So this is GBH borehole 0011.

A. So that borehole comes up through that area, and just passes through the back end of the goaf and we can see that it splits and there's two branches that continue on for quite a distance. A couple of points to make on this, and I don't know if this has been touched on, but it looks quite feathery. It looks as if the line has been sketched by just an artist in freehand. That's actually a whole lot of different branches of this, within the hole itself, and that's potentially significant in considering the amount of methane that's accessible or that's potentially released into this borehole because there's a number of branches that enter different parts of the seam and there's a picture later on just showing just where these boreholes can go, but it's branching off, and indeed if you count all of these little branches or sub-branches that come off these two main holes, there's about 25 different branches that are all feeding into that one hole.

Q. I think there's another map that perhaps illustrates this.
DOL.300.015.0009?

WITNESS REFERRED TO MAP DOL.300.015.0009

Q. And again, that shows the various boreholes throughout the mine?

5 A. Yes.

Q. It perhaps doesn't really take us much further but...

A. Well it just gives a layout of I suppose the design and the layout of the boreholes. Whether we go there now or later, but the red lines, and it's a little bit hard to see. Just to explain some of these things. The red
10 lines are the boreholes. This, I think it's a brownish-red coloured line is a fault as is this one down here. So sometimes it's a little bit hard to differentiate but these are boreholes primarily indicated as "for exploration".

Q. And can we see the goaf area intersecting with GBH0011?

15 A. Again it's not significant other than the fact that there's going to be a feed of methane from those holes into that area.

Q. And as you previously said to us, there was the occasion on the 17th of November 2010 when over 1500 cubic metres was flushed?

A. In about 45 minutes. So it wasn't instantaneous. It took a little bit of
20 time.

Q. The effect of a roof fall. Perhaps if we could have DOL.3000.1500.12 please?

WITNESS REFERRED TO DOL.3000.1500.12

Q. And this is illustrating both cases 1 and 2?

25 A. That's correct. And quite simply, what we're saying here is from this goaf situation there's paths that the air can take as far as blowing out either or both of these roadways. Down into this area the return is naturally already established down here. The intake is already set and potentially can come down here, particularly if there's disturbance to this
30 stopping. So you start to lose –

Q. And that's the stopping in cross-cut three?

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A. Cross-cut three, yeah. So we're suggesting that there's potential for gas to be pushed out of here, out of A heading and B heading and across this cross-cut three. I want to make a couple of points. It's got up there, "Windblast path," just need to be careful with the term windblast and probably touch on that later. Really all we're talking about here, we're not talking windblast and I'll explain that, but we're talking about if that roof collapses there's going to be a tendency to push anything that's in any atmosphere out of there. There's nowhere else of it to go other than out down those roadways.

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10 Q. In both inbye and outbye?

A. Yes, this is, we're indicating that that's the potential. Again, it's based on the loss of this ventilation device. The air circuit is going to continue for some time so there's air coming up this way around, which short circuit around here but after the initial, there's going to be a motive force from the goaf to sort of push it out through there.

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Q. Can we have please now DOL3000.1500.14 please?

WITNESS REFERRED TO DOL3000.1500.14

Q. Can you explain what we're looking at there please?

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A. Okay, this is an actual screen shot of the ventilation simulation modelling but it's been done with the injection of gas into the roadway so it's actually somewhat after the ventilation modeling's been done and this is actually what the ventilation model looks like but we'll touch on the ventilation later, but what this is trying to replicate is given the ventilation that's established in the mine, so the fan that's operating, the stoppings, the ventilation control devices that are installed in the mine, if they are in place and there was to be a significant injection of methane from this point, just where would it go? And that's what this is trying to determine. So, it's a simulation that models gas being injected at this point and it shows that it would in different percentages push down through these roadways, and into the return and to some extent up into these roadways as well. It won't necessarily continue to do that because the ventilation will tend to take over and take it back down this roadway but it will push a certain amount up into these areas below the

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nature of the intake. Again, it's potentially through number three cross-cut, number two cross-cut, down A and B headings into that roadway, into both of those roadways. It's fairly, it's very subjective. We're not looking at quantities of gas so much. We're not looking at really
5 degrees of confidence that this is the actual case, it's more the situation of if that gas was going to occur from there just where would it go, where would it conceivably go?

Q. And can we now please have, firstly, DOL300.015.0031?

WITNESS REFERRED TO DOL300.015.0031

10 Q. Now, this is another piece of modelling and perhaps it's one that should've been put up prior to the last one, but this actually shows the modelling of the ventilation system within Pike River.

A. That's correct. So, that's the ventilation model itself, simple single intake ventilation. All the blue is intake, it's the good fresh air. You can
15 see that it crosses over the return air, the red is return. What takes it from being intake to return is typically a mining place so an area where mining is occurring, so the air is passing through panel 1, once it goes through that mining area it becomes return –

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20 Q. Just stop you there.

A. Yep.

Q. And ask for a blow up of that area, DOL3000150032 please. Sorry, go on please.

A. That's all right, it makes it a bit easier to see, so you can see that's a
25 little bit like the simple ventilation model that we had before, we've got intake, it comes to this point, a certain amount splits off, there's about 30 cubic metres splits off and goes into the extraction panel, into the return and then down this way, there is an air crossing there so you've got fresh air going over the top of return air. Similarly, the 50 cubic metres
30 moves into the further areas of the mine. There's another split point here in which case there's about 24 cubic metres that comes down here and about 10 comes down this area of the mine where there's a roadheader, the red line here is showing ventilation tubes that run back

through that tunnel and even though it's shown outside the roadway it's schematic, it comes to an auxiliary fan there again at three cross-cut, so we've got tubes that come around here, through three cross-cut and directly into that return, so following this split there's also air that splits and goes up this way and we've got the drill rig that was up in here, a continuous miner that was sitting up in this area not being used, there's about four cubic metres there, two cubic metres in there of this – or was 11 or 12, it comes up in here, some of it goes up into that area, some of it comes and then the rest of it goes directly into the return. This is the area, I say this is six cross-cut one west, with this B heading continuation stub, that's supposedly ventilated with a brattice cloth to go up in there, there's supposedly a couple of cubic metres that goes up into that way. Back to this split, you've also got intake air that splits up this way about 20 cubic metres, some goes simply across what we call a standing place, standing place in the sense that it's not doing anything, there's no mining, it just simply goes up through that area and into the return, and then the rest of that air goes up into this B heading of two west I think it is, where the ABM miner is working, so that's about 140 metres and it's made to go up into that stub, that's a single roadway if you like and it's made to travel up the airway, it naturally just travels up into a dead end we need to use, as I've touched on, vent tubes and auxiliary fans to actually to get it to go up in there, so the fresh air comes up into this roadway, into the mining area where you're mining, where you're working, picks up the gas, the dust, the water, the heat and actually transfers it down, and I think this battery is just about flat,

A. If I can just return then to

THE COMMISSION:

30 Q. Could we just pause for a minute Mr Mander, I'll just clarify something. Is this plan and all of the statistics that appear on it an actual plan of the situation that existed in Pike River mine as at the 19th or is it some form of simulation?

A. It's a simulation but it's as close as we can get it based on the information that was available and modelling that had been done by ventilation engineers that had recently been there.

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5 **EXAMINATION CONTINUES: MR MANDER**

Q. Can we just return to the other modelling which was up previously, DOL3000150014. And does this modelling show how that ventilation or the effect of the ventilation in terms of the spread of the gas and potentially how it might be defeated?

10 A. How it would be defeated. It's certainly an indication of the prediction of where the gas could go given the case that we're talking about. So given that the methane is there, there's been a push of methane out of there, the stopping at cross-cut three has been breached just where the gas would go. So, as I said, given that ventilation model that we just
15 had a look at and where the air is moving, so air is intaking up through here, potentially comes into contact with that and is translated up into this area and is also translated down into this return through the ventilation system that's currently in existence.

Q. And the green area denotes what?

20 A. This one here, that one?

Q. Yeah.

A. That's just percentage of methane that's in there.

Q. And is there any significance of that particular percentage?

A. Well it's just different percentages of methane. That's, again, the
25 figures – this is where it gets very subjective. We're just saying that that's potentially around 10% methane, but hard to be conclusive on that one.

Q. Can I now take you to again Case 3 this time, and could we have up DOL.300.015.0023? I'm sorry, there's probably a better diagram, 0017.

30 **WITNESS REFERRED TO DOL.300.015.0017**

Q. Now in Case 3, this is the area where there could be or potentially could have been a build-up of methane. You've already touched upon this to

some extent already, but I think it would be useful to go back through it by reference to the actual labels of the various headings.

A. Okay. Do you want me to talk about the labels to start with?

Q. Yes, if you could.

5 A. Okay. Hopefully you can see the labels on there. So just from a point of clarification. Exactly the same as you need street names to know where you are on a map driving on a street, it's very simply the same sort of situation that we find ourselves within an underground mine, so we need to label roadways and different places, and there is a standard for that. Not terribly imaginative but then that's mining people. The left-hand roadway looking inbye is typically A heading. It starts from there, A heading, B heading, C heading for as many headings as you've got. From the start of that panel where it breaks away or turns away from the main roads, you number your cut-throughs or cross-cuts 1, 2, 3 and so on. So you start to develop a labelling system that's quite consistent throughout the industry generally, using letters for headings and numbers for cut-throughs or cross-cuts, and that tends to be fairly consistent internationally. So down here you can see A heading, B heading, C heading and the cut-throughs are numbered. Then as well as that, if there's and it depends how mines do it. So there can be a certain amount of imagination occasionally that goes into this, where you can actually name particular panels and it's up to you what you call them. But this particular mine was using the compass so in this area they were saying up into there was just the pit bottom north.

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A. Where it turns slightly away from north it became one west and then off one west panel, these roadways that are one west panel when it turned right it became one right and then next one in would be two right. So, it's really just a way of delineating where you are in a mine and accurately being able to pinpoint a particular location otherwise you don't know where you are or what people are talking about. So that was defined in a memo by the tech services manager I think only a few months before, just trying to remember now, might've only been July or

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August I think where they actually put it down in writing as to where it was and what it was.

Q. The map you previously referred to ending 0023, that actually does have on it, although it's very fine.

5 A. Yes.

Q. It actually does have on it the particular area labelled one west mains, pit bottom north and so on?

A. Yes. Now, really only say that because that's typically the way that we will talk and locate things in a mine. That's generally the way we talk, there's got to be some way of denoting particular locations and even to some extent plans. You can see up further that there's planned working areas of the mine and that's similarly got already starting to be named so that people can label it, can tag it.

10 Q. Now just going back now to case 3, the ABM panel and again now by references to those labels, can you just take us through again how the build-up of methane in that inbye area, the working area of the mine could have happened?

A. Okay, so, bearing in mind that this is, as I mentioned before, I'm talking about this area up in these particular roadways.

20 Q. And you'll need to refer to the name.

A. B heading of two right, one west, two right across this particular cross-cut, I can't read it but it would be, I would expect, one cross-cut down six cut-through and B heading one west, inbye six cut-through, A heading, one west inbye of six cut-through and A heading between five and six, cut-through's a cross-cut sorry, these are areas of particular concern that I've described before. This plan is not quite up to date. This roadway, B heading, of one west two right, actually comes up past those boreholes, it's actually I don't know how many metres past it, probably 20-odd metres past that particular location. The reason that we say that this is certainly a case that we're concerned about is that there's no gas problems up in there they'd been struggling with gas due to the intersection of those holes. There, similarly, they had been struggling with intersection of this particular borehole in the roadheader

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panel, so you've got that hole that had been intersected and was feeding, had been feeding methane into that roadway.

Q. Just pause there. And those boreholes, respectively, were GBH0012 up in the ABM panel.

5 A. Eight I think the other one is.

Q. And GBH008 in the A heading?

A. Yes. Now there's something I should point out. That's not to say that these particular ones were just open boreholes allowing methane to just pour into that roadway, they had been, as far as I'm aware, they had been sealed with what we call gas bags, so it's a chemical bag that's put into the hole and due to the particular chemical reaction it will actually expand and seal up that particular borehole and that had certainly been, they had been doing that in this area.

1650

15 A. The other thing that you attempt to do with these is to rather than just block them off is to try and grout or concrete or cement hoses into those boreholes so that they continue to be active, so you can actually plumb them and have – connect up to, if you can find both sides, the holes on both sides of that roadway and put a pipe inside them so that the drainage can continue, that's the ideal. The ideal is not to hit them at all but if you do then ideal to keep drainage happening, so this area is, as I say, it's active, there are gas sources in there, it's reasonably high as in the roadway is probably relatively, it's probably nearly as high as the ceiling in here, maybe not quite so, so it means it can be problematic to actually detect where the methane fringe is. The other thing that goes with this, sadly, is that it becomes very hard to ventilate this area of the mine. We find that from the ventilation modelling and the ventilation model had a fair degree of trouble in actually getting the model to work up in here and not reverse. Now, what that's meaning is that the ventilation is starting to run out of motive force, it just doesn't carry there anymore and this is borne out not only by the modelling but also by statements from deputies and even to some extent the general manager at the time, so there was quite a bit of information indicating the difficulty

of ventilating this. Do we keep going on that ventilation and how it works?

Q. No, we'll get onto that in terms of the, if you like the stretching of the ventilation system and the pressure on the system having regard to the activities at the various faces, but just to complete this piece of evidence, was there also an activity going on in A heading, in the dead end stump with drillers?

A. Yeah, well, just off A heading.

Q. Can you just take us through that please?

10 A. Okay, so there's a drill rig in this stub here so it's just off A heading, A heading was where the continuous miner was sitting and not being used, there was a drill rig in here drilling boreholes, exploration boreholes out through here, out through this fault and up into further areas of the mine, GBH19 I think.

15 Q. GBH0019.

A. Yeah, but at the time my understanding is that they were having trouble with that borehole or the drilling of that borehole in the sense that they had decoupled the rods, so the rods had actually come apart, so they were in the process of fishing, what we call fishing for those rods, so they had what are colloquially called fishing tools in that hole to try and pick up that rod and to be able to drag it back. Now, the significance of that is that it means that all of your equipment that's used for separating gas and water that come out of the hole are effectively disconnected so the gas is potentially free-venting out of here and just going into the ventilation nominally across this roadway and into that return.

25

Q. So again, the names of the returns?

A. Sorry, so from the drill rig itself across six cut through from A to B heading and then down to B heading main return.

Q. So that could've been a contributing factor to the build of up methane in this extreme inbye area of the mine?

30

A. That's correct, yes.

Q. Now, you had in your written statement ranked these areas cases one, two and three.

A. Yeah.

Q. Have you got any comment as to that ranking?

1655

5 A. Pretty much it was done because the two goaf scenarios were ranked
as 1 and 2 primarily because of the calculated volume that was needed
to be involved with and the difficulty, by deduction I suppose, in getting
the same sort of quantity in the inbye area of the mine that's shown on
this particular diagram. So by inference we're saying if the cloud was
10 600 to 1400 cubic metres, the goaf is a very likely source, it becomes
harder to get the same volume from the ABM panel and six cut-through.
So that's really the reason we ascribe to that one. The second one is
lesser of a case because we're saying that there's a combination of the
goaf gas with this panel gas in here. It's harder to get that combination,
15 but the reason that that is, if you like, an expected option is because of
the amount ignition sources in that area, if that makes sense. So it's
hard to put a weighting on the second case on how much gas from the
goaf, how much gas from this area, but we're more looking at a lot of
ignition sources in this particular area of the mine. And the third one, so
20 the scenario of it being gas layering up in the top area of the mine.
We've said its third primarily because of the volume of gas, but also
because one would hope that deputies and statutory officials that are in
this area doing inspections, experienced knowledge of workers, would
be managing the gas levels up in here so that they didn't get to those
sort of levels and quantities.

25 Q. What would be your expectation in terms of the type of monitoring in
order to detect the build-up of methane in that area?

1658

30 A. Well in that area, you'd certainly have monitors on the various
machines. You'd have personal gas detectors being carried by certainly
the statutory officials, potentially some others. Then it starts to become
a little bit problematic and I don't know if you want to digress into this at
this stage but from my perspective this is an awfully busy area of the
mine and the reason I say that is it starts to become problematic where

you put other detectors. I would certainly expect to see some detection in this area and this is where I say it's started to become busy. It would be nice to have some fixed telemetric monitoring but this particular area of the mine is going to be so, fairly fluid, that it's hard to lock in a place to put a detector and leave it there. However, having said that, one would expect that there would be monitoring on the auxiliary fan there in, well, in this case it's going to be A heading of that two right, one west, two right panel and I think the other fan is in six cut-through between A and B heading of one west, so on that fan. So there'd be monitoring on those two. It would be nice to have something further down in here but that's, as I say, it's a fairly dynamic area of the mine at the moment.

Q. And what do we know of what monitoring was fixed there?

A. As far as I know those were there, but they're not feeding into any recording system. They're primarily for monitoring the gas, localised monitoring and isolation of power in the event of high gas levels. Other than obviously the personal gas detectors that were carried by statutory personnel.

THE COMMISSION ADDRESSES COUNSEL

20 **LEGAL DISCUSSION** (17:00:25)

COMMISSION ADJOURNS: 5.08 PM

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