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: J Wilding, S Mount and K Beaton as Counsel Assisting

S Moore QC, K Anderson and K Lummis for the New Zealand Police

K McDonald QC, C Mander, T Smith and A Boadita-Cormican for the Department of Labour, Department of Conservation, Ministry of Economic Development and Ministry for the Environment

N Davidson QC, R Raymond and J Mills for the Families of the Deceased

S Shortall, I Rosic and D MacKenzie for certain managers, directors and officers of Pike River Coal Limited (in receivership)

C Stevens and A Holloway for Solid Energy New Zealand

N Hampton QC, R Anderson and A Little for Amalgamated Engineering, Printing and Manufacturing Union Inc

G Gallaway and J Forsey for Mines Rescue Service

G Nicholson and S Gilmour for McConnell Dowell Constructors

P Jagose for Valley Longwall International Pty Ltd

F Tregonning for Pike River Coal Limited (in receivership)

TRANSCRIPT OF PHASE 1 HEARING
HELD ON 12 JULY 2011 AT GREYMOUTH

COURT RESUMES ON TUESDAY 12 JULY 2011 AT 10.00 AM

WITNESS ON FORMER OATH

CROSS-EXAMINATION CONTINUES: MS SHORTALL

Q. Mr Elder, we adjourned yesterday as I was about to show you a document that I recall you said you'd skimmed around the time of Pike's IPO and we're now able to show you that document on the screens so let me start by asking you if you recognise this document that's now being displayed as a copy of the prospectus dated 22 May 2007 for Pike River's IPO?

A. Yes I do.

Q. And let me take you to section 9 of that prospectus. Do you see the heading, "Independent Technical Review?"

A. Yes I do.

Q. And if we turn the page in this section of Pike's prospectus do you see the first page of a report on BDA letterhead dated 17 May 2007?

A. Yes.

Q. And if we turn to the following page of BDA's independent review do you see a subheading, "Capability and Independence?"

A. Yes I do.

Q. And I know you said yesterday you didn't recognise the name Behre Dolbear or BDA so can I just direct you to the second paragraph under that, "Capability and independence," heading and ask you to read it aloud for me?

A. "Behre Dolbear Australia Pty Ltd is the Australian subsidiary of Behre Dolbear & Company. Behre Dolbear is an international minerals industry consulting group which has operated continuously in

North America and worldwide since 1911 with offices in Denver, Guadalajara, Hong Kong, London, New York, Sydney, Toronto and Vancouver. Behre Dolbear specialises in due diligence studies, independent expert reports, independent engineer certification in strategic planning as well as technical geological mining and process consulting. Directors and associates from the Sydney office of BDA have undertaken all the technical review work for this report."

Q. Now, BDA was commissioned by Pike River's Board of Directors to prepare an independent technical review of Pike River's feasibility studies and associated documentation suitable for inclusion in an IPO, wasn't it?

A. I'm sorry, that's a statement, I can't qualify my answer on that.

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Q. If I could just turn your attention to page 128 of the report, which is 135. Sir, it's just showing you on the screen now, page 128 out of the prospectus document -You see that page on the screen sir, it's 128. Sir, we're just showing you on the screen now page 128 out of the prospectus document. And if I could turn your attention to the top of the second full paragraph on that page where the words beginning, "The Pike River Board of Directors." Do you see that sir?

A. Yes, yes.

Q. And do you see there written there sir that BDA has described that the Pike River Board of Directors has commissioned it to prepare and independent technical review suitable for inclusion in an IPO?

A. I do.

Q. And as as part of BDA's technical, sorry as part of BDA's independent review those experts completed a technical risk assessment didn't they?

A. I'm sorry, if it says that I'll accept it but I don't see that there.

Q. Well let me take you through to page 140 of the prospectus, 145?

A. If it would help you, I do know that they included some assessment of risk in their report. Whether they completed a technical risk assessment to do that I don't know.

Q. Well I'm showing you now a table from BDA's report and you see the heading, "Table 5.1 Pike River Coal Mine Technical Risk Assessment?"

A. Yes.

Q. And in that assessment BDA opined on the adequacy of Pike River's understanding of the geology of the proposed mine, right?

A. Yes, I believe they expressed some significant reservations about that understanding in this report.

Q. We'll come to that Mr Elder. Now in fact if you look at the table on the screen, BDA scored the risk level in this report at low/medium in respect of the geological information at the proposed mine, right?

A. I know it says that but I think it's important to note that I think this indicates that they didn't really understand what they were doing when they did this report.

Q. But your testimony that BDA didn't understand what it was doing?

A. That they did not understand the complexity of the geology when they were writing that section because undoubtedly, and I think facts are proven in hindsight, that that was the case.

Q. Well Mr Elder we'll explore the basis of your testimony about what BDA, these experts, have stated in their report shortly but I'd ask you just to stay with me on my questions for the moment?

A. Of course.

Q. Now if I can turn your attention to the comments on the table. Could you just read aloud for me the section beginning, "Geology of the Deposit"?

A. The geology of the deposit is reasonably well understood and the geological data has been professionally collected and compiled. Drill density in some areas is perhaps less than ideal but is constrained by the terrain and consent conditions. There is reasonably drill cover over the central areas but there are some structural complexities in the deposit. Logging and sampling procedures were in accordance with industry standards. Extensive inseam drilling is planned once the seam is accessed. Poor coal recoveries have been recorded in some areas, but overall in BDA's opinion the geological database forms an

appropriate and reliable basis for resource and reserve estimation and I would have to note at this point –

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Q. If you just read please sir –

A. – that I would find it very difficult –

Q. – that was the question.

A. – to accept that comment.

Q. Sir, could you just read – you'll have an opportunity to testify, your counsel can ask you questions when I've finished. But at the moment sir I just asked you to read the statement.

OBJECTION: MR STEVENS (10:06:35)

CROSS-EXAMINATION CONTINUES: MS SHORTALL

A. Would you like me to carry on?

Q. Yes please.

A. "The resource estimate has been undertaken by specialist consultants Golder and reviewed by Minarco including validation of the data. The estimation methodology is generally appropriate although the structural interpretation is complex and has resulted in a reduction in tonnage from the FS, which I presume is feasibility study. The reserve estimate has been influenced by the interpretation of coal seam structures. Geotechnical, mine design, mine losses and dilution factors had been incorporated in the re-estimation of minable reserves. The methodology is considered appropriate and has generated a reserve estimate that provides a reasonable guide to the minable underground coal tonnes."

Q. And sir yesterday you gave evidence about JORC compliance, do you recall that evidence sir?

A. I do.

Q. And competent persons –

A. Yes.

Q. – under the JORC Code and if I just turn your attention to the last page of BDA's expert report, following the table that you've just read into the record – it's at page 148. Do you see a signature there for Mr Poppit?

A. I do.

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Q. And if I can turn your attention to the next page in this document. Do you see a heading there, “Qualifications and Experience”?

A. Yes, I do.

Q. And about half way down the page there’s a heading for Mr Ian Poppit, do you see that?

A. Yes, I do.

Q. And do you see in that summary paragraph there that Mr Poppit is described as being familiar with the latest ore reserve terminology under the JORC Code effective as at December 2004 and is qualified as a competent person under the JORC Code protocols?

A. Yes, and can I just clarify that I don't think a competent person under JORC Code protocols based on the JORC Code necessarily applies in all different geological circumstances. You may be qualified under the JORC Code to express a judgment in one territory but not necessarily in another.

Q. And the next sentence in the page at 144 of the prospectus states that Mr Poppit has been responsible for reviewing the geology, the resource and reserve estimates, the structural interpretation, panel layouts and has had input to the analysis of the geotechnical issues in this report, right?

A. Yes, I see that.

Q. Now BDA in its technical review reference work done by Golder. Do you recall that?

A. I recall reading that earlier, yes.

Q. And Golder is a global company providing consulting, design and constructions services, right?

A. I'm very familiar with Golder International here. Have worked with them and they have worked for Solid Energy in fact for a number of years.

Q. And BDA considered that the interpretation of the Brunner seam structure had been adequately covered by Golder in their JORC compliant resource statement, right?

A. I certainly have read that that is BDA's opinion, yes.

Q. Now BDA in its report as part of the 2007 prospectus identified a number of factors which it considered combined to reduce the sort of risk we've talked about in connection with the geology of the deposit at Pike River, right?

A. It discussed that I believe, yes.

Q. And, sir, if I could just turn your attention to page 142 which is 147 of the prospectus. Do you see a heading there, "Risk mitigation factors," at the bottom of the page?

A. Yes, I do.

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Q. And BDA describes there that there are a number of factors which combine to reduce some of the above risks and the above risks relate back to the chart that we've been talking about is the technical risk assessment, right?

A. Yes and I'd like to clarify what that statement says, because what it notes is some factors which reduce risks, it doesn't make any statement whatsoever about whether those factors result in an acceptable residual risk, which was one of my key points yesterday.

Q. And the first factor that BDA identifies as a risk mitigation factor, relates to surface drilling, doesn't it?

A. Yes and in fact I know there were another eight bore holes done between 2000 and 2007, so the total which I expressed yesterday was inadequate of 20, it went up to 28. It's probably of interest to note that when Spring Creek started in around 2000 we had something like 115 bore holes which we considered inadequate in a similar resource size. As of today we have something like 360 to 400. So, moving from 20 to 28 is actually, with respect, somewhat irrelevant.

Q. You didn't mention inseam drilling in your evidence yesterday, did you Mr Elder?

A. I did not, no.

Q. And you understand that inseam drilling and those using a drilling machine underground to drill bore holes horizontally within a coal seam instead of vertically down from the surface, right?

A. The key point about inseam drilling is that once the mine is laid out and once you're in the mine, it assists you for the next part of mine development, but it is not possible at that stage to use inseam drilling to correct fundamental floors and the layout of the mine should they exist and I will note that I – I'm not expressing an opinion on the layout of the mine, simply the point that inseam drilling is too little too late if in fact you have problems by that point.

Q. Well BDA considered that Pike River's plans for inseam drilling was a mitigating risk factor, didn't it?

A. And as I said mitigating doesn't mean the residual risks are acceptable.

Q. Well BDA found that the ultimate mitigating factor for the resolution of coal seam structural interpretation and geometry issues, as well as in the detection of structures that may materially affect the development and/or panel designs is the proposed ongoing programme of inseam drilling at Pike River, didn't it?

A. And certainly it would be my opinion that that would not be sufficient to be able to plan and design a mine adequately if you were relying on inseam drilling to be your ultimate solution to geology.

Q. And is it your evidence sir that Pike River was relying on inseam drilling to be its ultimate solution?

A. What I'm reading here is that it's the ultimate mitigating factor it would seem.

Q. Well BDA commended Pike River in its independent review, for its approach to inseam drilling, didn't it?

A. BDA also has some other fundamental flaws in a report which I'm happy to address later if you wish.

Q. And BDA also found that Pike River's geological data sets and the capability of supplying information on request was of industry standard, right?

A. I'm not sure what industry standard they refer to, but if Solid Energy is considered to establish anything near the industry standard then I would have to disagree that – with their conclusion there.

Q. But sir you're not disagreeing that BDA in its report found that Pike River's geological data sets and capability of supplying information on request, was of industry standard, right?

A. I acknowledge that's what they said in their report, yes.

Q. And sir we talked yesterday about the fact that when a competent person signs off on information that's used publically, they're exposed to liability if they haven't taken appropriate care and exercised due diligence, right?

A. Yes I certain understand that, yes.

Q. And BDA concluded that Pike River's coal resources – coal resources and reserve estimates prepared by Golder and Minarco, were JORC compliant, right?

A. I'm sorry can you refer me to the place they said exactly that?

Q. On the screen you'll see the first page Mr Elder of BDA's independent report and do you see a series of bullet points there?

A. Yes I do.

Q. And I'm reading from the report from the findings contained in the ITR investigations to date, BDA concludes as follows, and can you just read that first bullet point for me?

A. Pike River coal resources and reserve estimates prepared by Golder Associates (NZ) Limited, "Golder" and Minarco Asia Pacific Pty Limited, "Minarco" respectively have been prepared in accordance with the Australasian Code for reporting of exploration results. Mineral resources and all reserves prepared by the joint all reserve committee of the Australasian Institute of Mining in Metallurgy, Australian Institute of Geosciences and Minerals Council of Australia, JORC, effective December 2004, "the JORC Code." BDA has not undertaken an audit of the Pike River data or a re-estimate of the resources but has reviewed the resource and reserve estimates carried out by independent consultants.

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Q. And BDA concluded that Pike River's forecast contained within its feasibility study and associated documents were based on adequate geological and geotechnical data, right?

A. Ah –

Q. Taking account of the expected mining conditions?

A. It's my understanding that's what they say, yes.

Q. Do you recognise the name Resource Developments Consultants Limited Mr Elder?

A. Resource Developments Consultants –

Q. Consultants Limited?

A. – Limited. I believe I do. You may have to give me some context to help me remember that further.

Q. Do you understand sir that they're sometimes referred to as RDCL, does that assist?

A. I'd assumed that and that does ring a bell, yes.

Q. And Roy RDCL is a specialist geological engineering geological and geotechnical firm, right?

A. My recollection is that's probably correct, yes.

Q. And RDCL has advised Solid Energy on various mining projects hasn't it?

A. I think that's why I recall the name. I'm not directly familiar with them myself.

Q. And RDCL was commissioned by Pike River to complete an independent review of the geological data required since the original 2006 resource statement that was released in 2007 as part of Pike River's IPO, right?

A. I'm sorry, I'm simply not qualified to tell you whether you're right or wrong on that.

Q. Well let me take you to a document, we'll just bring it up onto the screen Mr Elder.

WITNESS REFERRED TO DOCUMENT ON SCREEN

A. I'm certainly happy to accept it if that's what you're telling me.

Q. Well let me just show you the document and see if that assists us just for a moment Mr Elder. Do you recognise this document as a prospectus issued by Pike River in April 2010 for a capital raising?

A. I don't recognise the document but I accept that that's what it is.

Q. And if we just turn to page 33 of the prospectus. Do you see a heading, "Executive Summary?"

A. Yes.

Q. And do you see there Mr Elder that, mention that Pike River had commissioned RDL to complete an independent review of the geological data required since the original 2006 resource statement was released in 2007 as part of the IPO?

A. Yes.

Q. And you'll agree with me that the prospectus is public information?

A. It should be, I assume it is.

Q. And a copy of RDCL's independent review was included actually as part of the prospectus issued in 2010 wasn't it?

A. I'm sorry I don't know but I'll accept it.

Q. If you just come two pages earlier. We're still in the prospectus Mr Elder, do you see a heading, "Appendix 1?"

A. Yes.

Q. And title, "Independent Review New Geological Data with Respect to 2006 Resource Statement Pike River Coal Mine?"

A. Yes.

Q. And in the bottom right hand corner, RDCL, right?

A. Yes.

Q. And as part of RDCL's independent review RDCL judged as robust Pike River systems for the acquisition of geological data, right?

A. I'm sorry once again, you're asking me to confirm a statement and I can't. I'll assume it's correct though if you're saying that.

Q. Let me just as you a couple more questions on this Mr Elder and then we'll move on. Let me take you to page 34 of the prospectus, and do you see a heading, we're actually in, just to give you some context Mr Elder we're looking at the independent review done by RDCL that's

attached to the prospectus document. Do you see a heading on this page, "Geological Data since 2006?"

A. Yes I do.

Q. And could you just read that first paragraph for me please?

A. RDCL has commenced mine development and has established systems for the acquisition of geological data on an ongoing basis which are judged to be robust. Work is ongoing and assimilating the new geological data to update models for utilisation in mine planning.

Q. And as part of its independent review Mr Elder RDCL noted that an additional 14 surface drill holes had been completed since the 2006 resource statement, right?

A. Sorry, I don't know.

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Q. Let's just turn ahead two pages in this independent review, page 38?

A. I do note there the comment that the risk of a scarcity of data for modelling could impact the ability to accurately define local variations within the deposit which of course is very consistent with my evidence yesterday.

Q. Do you see a heading on this page of RDCL's independent report that states surface drilling?

A. Yes.

Q. Could you just read that first paragraph for me sir?

A. "The 2006 resource statement incorporates data up to and including PRDH 26. An additional 14 surface drill holes of which there are 12 with geological information, logging information suitable for comparison have been completed since the 2006 resource estimate was published. Five drill holes have been completed primarily for resource definition purposes with geological logs and coal quality data available." So that, as I understand it, is saying that there are now something like 40 drill holes in total which is still not very many.

Q. That's your opinion sir.

A. You asked me to compare before to industry practice so I would say that's not consistent with New Zealand industry practice, if you prefer that answer.

Q. And just to be clear Mr Elder, I think you told me this yesterday, you're not qualified as a competent person under the JORC Code, are you?

A. I've been practising as a geotechnical engineer in the coalmining industry for 11 years. I consider myself very competent to judge on whether data is adequate or not adequate for the purposes of running a coal business and in fact we have five underground mines that I've been overseeing in my time at Solid Energy. I consider myself totally qualified to judge whether the information that I receive as a chief executive on the data for those mines is appropriate for the purposes of business decision making, which of course was the point of my evidence.

Q. Let me just bring you back to my question Mr Elder, which I think you just refuse to answer there, but I asked whether you were qualified as a competent person under the JORC Code?

A. And of course the point of my evidence is that you are looking –

Q. – Just answer the question sir?

A. I don't consider myself a competent person nor do I consider I would need to be if I have competent people working for me.

Q. Now, ACL, in its report also found that nine inseam directional drill holes had been completed for a total of more than 7300 metres, right?

A. Sorry, I've lost it, if it says that there.

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Q. Just turn to the next page if we could, come to the next page in this document Mr Elder, you see that there's a diagram and then under that there's some text. Can I take you to the first sentence of the second paragraph under the text, could you read that for me sir?

A. Yes, "The inseam drilling process involves completing the seam roof intersections, firstly as the hole is being advanced. Current practice targets roof into sections at a nominal 40 metre interval. The floor intersections are then completed during the retreat from the hole branching down through the seam floor. To date nine inseam

directional drill holes, figure 3, have been completed for a total of more than 7300 metres. The geological data obtained from the inseam drilling is utilised to refine mine development design and enables the accurate placement of primary access development. The nature of the sample chips derived from the inseam drilling means this is not an appropriate tool for collecting coal quality samples for analysis," and if I may note regarding that that that's used to refine mine development design and my point before stands that you can't address fundamental mine layout issues at that point should they exist.

Q. And RDCL is part of its independent review saw inseam drilling as key to managing geological risk at Pike River, right?

A. I don't recall the word "key" but I certainly recall it said it was a risk mitigant to which I replied, "It may mitigate the risk, it doesn't necessarily make the risk acceptable." I don't believe I heard the word "key."

Q. Let's just turn to the next page in this document, that's RDCL's independent technical review at 46 (inaudible 10:26:45). You see a heading, "Recommendations," there Mr Elder?

A. Yes, I do.

Q. And there's a subheading, "Inseam drilling"?

A. Yes.

Q. And there's a paragraph and then there's two bullet points and then a paragraph starting, "Inseam Drilling," do you see that?

A. Yes, and I can now see where the word "key" comes from. Obviously I hadn't seen that when you asked the last question.

Q. Yes, because RDCL actually states, doesn't it, in its independent review and I'm quoting from the document, "Inseam drilling is seen as a key to managing risk associated the previously unrecognised geological features in the mine. The new data shows that inseam drilling is providing a much improved insight into the detail of the structural controls of the Brunner coal measures." Right, do you see that Mr Elder?

A. Yes, could I, could I perhaps just make the comment here that I think is very material. Fundamentally this is all about the geology. Whether the

geology is well understood or not is of course important but it is the starting point to whether a mine can be planned and operated productively and of course the conclusions that are taken from the geological drilling are fundamentally important to that and I certainly have views on the conclusions that are being expressed on the basis of this which I think establish that the geology either wasn't understood as well as it should've been or the ability to mine was not understood sufficiently well from that so I am concerned that the implication here that the people viewed the geology, geological investigations were good therefore confirms the mining method was good and that's not necessarily a correct assumption I don't think.

Q. But just so I'm clear, Mr Elder, we're looking at a report that Pike River commissioned from an independent expert, right?

A. Yeah, and, and I believe there would be, people at Pike River would be entitled to rely on this report but there should also have been people at Pike River as I would expect in Solid Energy who would know where there were flaws in a report like this.

Q. Sir, RDCL's report was signed by a competent person under the JORC Code, right?

A. I'm sorry you'll have to refer me to that but I'll happily accept it.

Q. Well let me just do this very quickly, last question on this document, Mr Elder. If we could go to page 46 which will be your 48. Do you see a signature on this last page of RDCL's technical review, Mr Elder?

A. Yes, signed by somebody called C P Church a principal geologist.

Q. And if we just turn to the prior page in this document, so your 47. Just tuning back one page in this report, Mr Elder, do you see a heading, "Statement of Capability"? It's the top, number 7.

A. Yes, I do.

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Q. And do you see there, Mr Elder, a statement that the report has been prepared by Peter Church and you've just talked about his signature at the end of the report and that Mr Church is an RDCL employee which responsibility for the preparation of coal resource estimates and also the

competent person with regard to JORC Code for RDCL and previously for Golder (NZ) Limited. See that Mr Elder?

A. Yes, I think there's an important point here that, as I said before, competent person is required under the JORC Code to be related to the specific geology in which you're working so a statement of a person being a competent person, I can't judge on whether that means that they're competent for the particular resource that they've expressed an opinion on and I think that's a fundamentally important point about this entire discussion.

Q. And just so I'm clear Mr Elder, when a competent person signs off on a technical report that is relied upon by a company and its individuals, the competent person is taking on liability in the event that their review is found to be deficient or lacking in due diligence, right?

A. Yes, you've made an important point there which I agree with. If I were a member of the board of directors for example I would expect to be able to rely on this. The point is who in the company should have understood whether or not this report was suitable in the first place to be provided for example in a prospectus or for the board.

Q. You didn't mention RDCL to the Commission in your evidence yesterday, did you?

A. Not that I recall, no.

Q. And you didn't mention the Minarco review?

A. No.

Q. You didn't mention the Golder review?

A. My evidence yesterday related to discussions, information provided to me through a range of means and although these may have been public these were not any of the reports I was familiar with at the time, at least not by name.

Q. So in forming your views Mr Elder about the adequacy of the geological information at Pike River, there was some public information you didn't consider, right?

A. No, what I said was I wasn't familiar with the names of this report but I was certainly familiar with the contents and, as I think I've already

suggested in the answers to counsel's question here, I've been aware right throughout and during the time of reading the prospectus information that it did not change my views which was I think evidence I gave yesterday, and I can still find very clear statements in here that are fundamentally incorrect and would cause me to question the conclusions in this report.

Q. Well, just to follow up on one point there Mr Elder, I think you're now saying that you were aware of these reports, but one of the reports was completed by BDA, right?

A. Yes I think we established that.

Q. And when I asked you yesterday if you even recognised the name BDA you said no, didn't you?

A. I think what I said was I didn't recognise the name BDA but I had read all the reports so what that said was I didn't associate the name BDA in any particular way with the reports in the prospectus, that was four years ago. Maybe at the time I noted the name BDA, it wasn't something that registered with me as particularly significant either way.

Q. Well, maybe we'll let the record speak for itself there Mr Elder. Let's move on. Do you recognise the name John Dow?

A. Yes I do.

Q. And you understand that Mr Dow is the chairman of Pike River Coal Limited in receivership, right?

A. Yes I do.

Q. And Mr Dow has been a non-executive director of Pike River since February 2007, right?

A. Sorry, I don't know the date but I accept that.

Q. Do you have any reason to believe that's not accurate Mr Elder?

A. None whatsoever, no.

Q. And Mr Dow was a member of JORC itself, wasn't he?

A. Sorry, I don't know but I have the greatest admiration for Mr Dow and I wouldn't be surprised if he was.

Q. You don't have any reason to believe that he wasn't, do you Mr Elder?

A. No, I'm simply saying I can't confirm your statement.

Q. Now, you testified earlier that you are on the board, or yesterday, that you are on the board of New Zealand's Resource Industry Association known as Straterra, right?

A. Yes.

Q. And Mr Dow was Straterra's foundation chairman, wasn't he?

A. Yes he was and in fact I was one the people who asked him to take that post because I very much respected his position in the industry.

Q. And you and Mr Dow were on the Straterra Board together for around two and a half years, right?

A. That sounds about right, I can't recall the exact period.

Q. And during those two and a half years the Straterra Board met in person around every six to eight weeks, right?

A. Yes that would be right.

Q. So you saw Mr Dow approximately every six to eight weeks for approximately two and a half years, right?

A. Yes.

Q. But you never said to Mr Dow that you believed Pike River had insufficient information to proceed with mine design and development at a level of risk consistent with what Solid Energy would consider good industry practice, did you?

A. I think there's a key point here before I answer that.

Q. If you could just answer my question then you're welcome to make your point Mr Elder?

A. Yes, okay. I never did and the reason for that is that I think in the circumstance the onus is not on outside parties to approach a party and say I have views on your business. The onus is on a business to understand where its risks and uncertainties are and where good sources of information may be to address those. I never viewed it was Mr Dow's role to form a view on information provided to him as a director of the company.

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A. So, no I would never have regarded it's my duty to ask Mr Dow or express views to Mr Dow. Had Mr Dow ever asked me, however, did I

have views on the information provided to him as a director of Pike River, I would happily have given him an answer, but I would also make the same assumption about Pike River and Mr Dow and the management as I would make about any company, that if there were significant risks that they would be doing everything they needed to, to address those risks and once again I emphasise it would never be my role or the role of an outside party of any kind, to express a view to a company that you may have uncertainties that you don't understand, you may not be managing those appropriately. The assumption about a good industry player, a good company, is that they would understand those risks and they would be managing them accordingly. I would've needed specific facts before I would've specifically approached them. What I've expressed is a very broad conclusion based on a very wide range of evidence which said that they had very significant risks. It would be a reasonable assumption to me that they would understand and would be managing that in some way.

Q. So just so I understand your long answer there Mr Elder, you refer to not having specific facts at the time, right?

A. The specific facts I had are well contained in my evidence from yesterday and in fact some of them come up again in the reports that you've put forward here today.

Q. Just so I understand your last answer correctly, I believe you've told the Commission that one of the reasons you didn't say something to Mr Dow, notwithstanding seeing him frequently for two and a half years, about your concern as to whether Pike River may have had insufficient information to proceed with mine design and development was that you didn't have specific facts at that point in time, right?

A. I think the key point is that the consequences of not having all that information where a wide range of risks and a wide range of areas which were abundantly self evident at that time, I'm sure to Mr Dow, to management of Pike River and in fact to the entire industry because by the time Mr Dow and I were working together on Straterra, the entire

industry were aware that Pike were having significant difficulties with production. It didn't need me to tell them that.

Q. I'm not asking you about difficulties with production Mr Elder, I'm asking you about the concern that you test – that you gave evidence about yesterday concerning whether Pike River had sufficient information to proceed with my design and development. I just want the record to be clear that, that my understanding from what you're saying is that, at the time that you were on the board with Mr Dow, you didn't believe that you had specific facts to come to him and raise this purported issue. Is that right?

A. I think you're confusing, with respect, the timing here. All my evidence related to the period from 2000 through to about 2007 and beyond which was where I had the facts and formed the view that Pike didn't have enough information to proceed. Again, if I may, as you've just established the period in which I knew Mr Dow, the last approximately two and a half years, by that time Pike River was already well under development. The problems and issues were already clearly manifesting themselves, so there is a different time. I think you're asking me about things that you're suggesting overlap when in fact they don't.

Q. Well you never said to Mr Dow, let's just talk about the production point for a moment that you've helpfully raised Mr Elder, you've never raised with Mr Dow that you believed so-called production or financial issues may be creating or elevating risks of Pike River, did you?

A. Again it's the role of the company with those risks to seek outside advice from people who may have information to provide. It's not the role of a range of outside people to go to Pike River or anyone else and say, "I think you may have problems, I think you should ask me to help you," although it's widely, a widely held view within the industry and in fact the community that many other people may well have done that. that's hearsay and anecdotal from my point of view and that's not the way I work.

Q. And just so I'm clear Mr Elder, you mentioned that there's a role to seek outside advice, would you agree with me that the reports we've gone through from the likes of Minarco, Golder, BDA, RDCL comprise outside advice?

A. They certainly comprise outside advice and they certainly comprise the sort of outside advice that I would expect a board and directors on a board, who are non-executive directors, to be able to rely on.

1040

Q. Just turning back to one other risk factor that you gave evidence about yesterday Mr Elder. You never said to Mr Dow that hydro-mining at Pike River created a unique elevated safety risk did you?

A. I don't believe I said exactly that yesterday either.

Q. Your evidence today is that you didn't yesterday say that hydro-mining at Pike River was a potential elevated safety risk?

A. Well you've just changed the wording. I, I'm willing to accept the specific wording I used yesterday but not to have it paraphrased.

Q. All right, we'll let the record reflect what you said yesterday Mr Elder and move on. You never contacted the mines inspector at the Department of Labour to say that you believed Pike River had insufficient information to proceed with mine design and development at a level of risk consistent with what Solid Energy would consider good industry practice did you?

A. With respect, I think that's a somewhat irrelevant question from my point of view because a chief executive of another company who overseas many mines, many other operational activities, and having people involved in our own activities on the West Coast I would not see it as my role to approach the mines inspector, which is a local role on the West Coast, to express specific views. What I believe and since you asked me, once again this is hearsay, but I do believe that the mines inspector may well have been approached by a range of other people but it would not be my role to make that approach.

Q. So you never contacted the mines inspector with any purported concerns about how so-called production or financial issues might be creating or elevating safety risks at Pike River did you?

A. I had no reason to do that.

Q. And yet sir yesterday you described that one of the reasons that you provided a voluntary statement to the Royal Commission was out of respect for the community and concern for the community. Do you remember that evidence Mr Elder?

A. I remember that very well.

Q. But you never contacted, we went through this yesterday, Mr Whittall, Mr White, Mr Dow, the mines inspector at the Department of Labour with any of these concerns out of respect for the community prior to the incident on the 19th of November 2010 did you?

A. No I didn't and I'd like to be very clear on that. The purpose of my evidence yesterday was to establish, in my view, very clearly that from the beginning Pike River was a mine that was destined to have financial production and commercial difficulties and extreme difficulties. The evidence I gave also suggested that a range of other risks would result from that but I was never in a position to judge whether those risks were being managed acceptably. And as I said yesterday, given the experience of the people at the mine, it would be a reasonable assumption to assume that notwithstanding the financial and production difficulties the management at the mine would irrespective always manage safety first. And again I said yesterday Solid Energy closed two mines which were still able to produce coal economically because we did not believe we could mine safety. I made the assumption that others would understand those risks and would always put safety first in their management. So, no, I did not approach anyone at Pike River regarding my concerns about the risks because I believed it was a totally valid assumption that irrespective of financial and production difficulties safety risks would always be managed first.

Q. You gave evidence yesterday that Solid Energy currently operates two underground mines, Huntly East and Spring Creek, correct?

A. Currently, yes.

Q. And you also gave evidence yesterday that Solid Energy is a West Coast stakeholder with a number of future mines under development, planning and longer term prospects under investigation, right?

A. That's correct.

Q. And you've also said that you provided your evidence to the Commission voluntarily, we just covered that, right?

A. Yes.

Q. And you said that one of the reasons you did so was for the Commission to be able to provide best and most appropriate recommendations going forward, right?

A. Yes I did, that was one of the three reasons I gave.

Q. And Mr Elder no doubt you did so because you're aware that there's a potential that the Commission may make findings which affect the coalmining industry, right?

A. I certainly expect they will make recommendations that will have implications for the coalmining industry.

Q. And those recommendations might apply to all underground mines in New Zealand, right?

A. I expect they will rather than might apply to all underground mines.

Q. For example, the Commission might make recommendations for tightening the legislative and regulatory regime which applies to underground coal mines, right?

A. I expect it will recommend a number of changes, what , "tightening" means I can't judge.

1045

Q. It's possible, isn't it Mr Elder, that the Commission might make recommendations which result in more onerous obligations being imposed on mining companies in relation to various aspects of their operations, right?

A. I think it's more than possible, I expect that and in fact it's Solid Energy's position on the record that a strengthened mine inspectorate for

example with greater capability is an important part of that so I have no concern whatsoever that the Royal Commission will come up with more onerous requirements on the industry and Solid Energy would support that should that occur.

Q. So you expect – sorry please finish?

A. Should that occur we would support that and that's the reason for my evidence, to help the Commission to be as informed as possible in arriving at its conclusion from those recommendations. We have no resistance to that and I have no reason to be concerned about that provided it's an informed position.

Q. Would you agree with me sir that it would be in your company, Solid Energy's interests, for the Commission's findings to focus on unique issues for Pike River Coal and not the underground coalmining industry generally?

A. No, I wouldn't accept that at all.

Q. You gave evidence about these future mines, underdevelopment planning and longer term prospects under investigation and one of those prospects is the assets of Pike River in receivership, isn't it?

A. That is indeed an asset that is currently available, yes.

Q. And in fact Solid Energy has submitted a bid to purchase those assets, hasn't it?

A. There is a process underway, the only thing I'm able to say is that Solid Energy is a potential participant in that process. I should note Your Honour that there are some confidential requirements under that process and my answer is neither confirming nor rejecting that we may or may not have submitted a bid or any other form of expression of interest.

Q. Well, Solid Energy, and I'm not asking you to breach any confidentiality restrictions Mr Elder, but Solid Energy has submitted as – or made a press release saying that it submitted a bid to purchase Pike River's assets, hasn't it?

A. The process is that the receiver requested indicative bids which are non-binding and are relatively high level and there is a continuing

process from that point and, as I said, all I'm able to say is that Solid Energy is a participant in that process.

Q. So Solid Energy has a vested interest in the value of Pike River's assets, doesn't it?

A. I'm sorry, I don't understand the question.

Q. Well, it would be in Solid Energy's interests for any price that it ultimately may have to pay for the Pike assets to be as low as possible, wouldn't it?

A. The answer is yes but I have to state that I take offence at the implication of the question.

Q. And one way of trying to lower that price would be to discourage other potential buyers by providing the sort of evidence that you have over the past two days, wouldn't it?

A. In that case I take – I reject that and I take great offence at the question, 29 people are dead, there are 29 people that didn't come back from the mine, that's 29 very good reasons to present my evidence if it can assist the Commission to find the right answer. I take great offence at the implication of the reason I am here is to talk down the value of the Pike River assets. That's already been done by the company, that's been successfully achieved, that's not why I'm here. My purpose in being here is to support the community, to support the Royal Commission finding the best possible answers to this question and I'm sorry, I'm very offended at that point.

Q. One way of trying to lower the price would be to discourage other potential buyers by saying, and these are your exact words, "That the economics of mining the Pike River coalfield are marginal," right?

A. You are connecting two points together which is a statement of fact, or at least opinion of ours, and the conclusion you are drawing from that, that our purpose is to talk down the value. That is not correct. Our purpose in making a statement earlier in the year was to make sure that everybody is well informed about the nature of mining on the West Coast including prospective future miners of the Pike River

resource, which we stated very clearly and that's my purpose in being here as well. Connecting those two, once again I reject.

Q. As the CEO of a state-owned enterprise Mr Elder you don't frequently express interest in purchasing an asset that you consider to be marginal economically, do you?

A. Sorry, I'm – you connected a number of points there together and I'm trying to work through them. Can you repeat the questions slowly please?

1050

Q. Happy to do that, Mr Elder. As the CEO of a state owned enterprise you don't frequently express interest in purchasing an asset that you consider to be marginal economically, do you?

A. In fact that's incorrect, in fact we do. Can I give an example of that? The lignites in Southland which it is well known are both a marginal economic resource as they stand and which for many years Solid Energy has expressed an interest in would be a precise example of the sort of place where we would indeed express an opinion that we have an interest in a marginal economic resource for a wide range of reasons. The point of course about interest in a marginal economic resource is under what conditions you obtain it and what you intend to do with it.

Q. And Mr Elder another way of trying to lower the price of Pike River's assets would be to contest Pike River's coal quality, wouldn't it?

A. That's, that's a hypothetical question. I don't understand why you're asking me that.

Q. Could you answer the question Mr Elder?

A. Well can you ask it again because I'm not really sure I even understand the question.

Q. Well another way of trying to lower the price of Pike River's assets would be to contest Pike River's coal quality, wouldn't it?

A. I know where you're going but I don't actually accept that. You say – again can you please read it?

Q. I'll read it for a third time Mr Elder. Another way of trying to lower the price of Pike River's assets would be to contest Pike River's coal quality, right?

A. Well the assumption in the question is that there is an attempt to lower the price so therefore I cannot answer that question.

Q. You can't or you won't, sir?

A. No, I can't because you're a making an assumption which I'm required to accept if I answer the question and I can't accept that.

MR MOUNT ADDRESSES THE COURT – REFERENCE NUMBER FOR PROSPECTUS DOCUMENT FROM APRIL 2010, DA012.03212

MR DAVIDSON ADDRESSES THE COURT – ORAL APPLICATION ORDER

LEGAL DISCUSSION (10:53:23)

1055

CROSS-EXAMINATION: MR HAMPTON

Q. Dr Elder you've heard the discussion between the Commissioner and myself, so the first area regulation 23 of the Underground Mining Regulations prescribes rules about access – I think it's described as, "outlets," to mines underground, doesn't it?

A. I believe it does, I have to acknowledge that I am familiar with and have read the Underground Mining Regulations, but I do not have a detailed working knowledge to that, to that extent.

Q. Just then in relation to Spring Creek, what are the means of access to Spring Creek? First are there two means of access to Spring Creek?

A. Yes, perhaps if I could refer back to the regulations first, I believe it to be the case although I can't say with certainty that almost every clause in the regulations requires a company or a miner to take all practicable steps to provide certain things and in this case it's means of egress. I don't recall the specifics. So, with regard to that then at Spring Creek there are two means of access to or egress from the mine. One is

what's called the men and materials drift, which is the normal way of going in and out of the mine and the second is where the coal is conveyed out, which contains a lot of infrastructure, it's an alternative fallback means of egress.

1100

Q. And is that alternative means of egress one with a concrete path in along which miners or people underground can process out?

A. It is today, it wasn't always so.

Q. Right. So you have in effect two drifts or drives into that mine?

A. I think the answer to the question is that there are two ways of walking out of the mine. Walking being defined as a normal mode of walking underground, yes.

Q. With the main drift being also accessible by wheel transport?

A. That's correct.

Q. Huntly East, what's the position there please?

A. I'm at risk of getting this wrong and I'll confess that. I believe Huntly East –

Q. I won't hold you to your word sir?

A. I wish to make very clear that I'm not certain of the answer but I believe that Huntly East has more than two means of access egress. I think it has three, possibly four, but again I'm sorry I'm not certain of that. All of which are normal walkable as opposed to alternative.

Q. I was informed that it has at least two drives, as it were, parallel with each other?

A. It has at least two, that's correct.

Q. That's the first point thank you if the Commission pleases. The second is your appendix A to your evidence Dr Elder, it starts at the document SOL 306956_1/35.

WITNESS REFERRED TO DOCUMENT SOL 306956_1/35

Q. You've heard by discussion with the Commission, you were aware I imagine of the Robens philosophy in this area of health and safety?

A. No I'm sorry I'm not.

Q. You're not?

A. If you explain it to me I may recall it but I'm not familiar with the name.

Q. Well it involves not only Government involvement and employer involvement but it involves employee involvement as well, consultation, participation by employees. I look in your charter that you wrote, you tell us, for involvement of employees, and in particular health and safety representatives from employees. Where do they figure in that charter please Dr Elder?

A. They feature in a number of places and I'll probably need to take you through to answer the question and point out each place in which it occurs, if I may? So in the purpose it identifies how health and safety is managed right down to frontline operations. Frontline operations are obviously frontline for employees working at the face. That's on the beginning of the first page. If I turn over to the second page and I look at our health and safety policy statement, and I note the items there which explain how we will achieve this, thank you for that. And as I look down there if, I think it looks like about bullet number seven, "Expect all our staff and contractors to be personally committed to a safe and healthy workplace." And the bullet following that perhaps is the one you're looking for, "Involve our staff in developing health and safety policies, standards, systems and programmes." Two bullets from there, "Train and support our people to understand and address health and safety issues and practices." The next bullet relating to onsite contractors ensures that those principles are extended to contractors not just our own staff. And then below that a very clear accountability statement which is, "That health and safety is the responsibility of everyone working in or working with Solid Energy everywhere, on or off site at all times," and very specifically, "Every person at Solid Energy has the responsibility, and this is key, the authority, and authority is delegated authority in our statements of delegated authorities, the authority to take whatever actions are necessary to avoid accidents and prevent unsafe actions or practises. So I believe that states very clearly that employees are very actively involved in all aspects of our health and safety work and that is in fact the case.

1105

Q. Do you actively engage your workers, the miners underground, in participation in the identification, assessment and control of workplace hazards?

A. Absolutely we do and as I recorded yesterday those hazards and incidents are recorded, logged and investigated. I see many of them, they come direct to my email every day and many of those are logged by our employees, not by management or supervisory staff.

Q. Where does that appear in this charter?

A. This is a governance charter, what we're referring to here is a health and safety management system and standard operating practises which are referred to in the charter and that reporting, logging is indeed covered by our standard operating practise which is governed by this charter.

Q. Was there union involvement or worker involvement in the writing of this charter?

A. This charter was primarily, as I said yesterday, written by me.

Q. Yes.

A. Discussed with my management team.

Q. Yes.

A. And the board.

Q. Yes.

A. And the management team discussed it at the health and safety forum which is a cross-company safety forum we have.

Q. Was this before or after it was ticked off by the board?

A. Before.

Q. Did they have active input into the writing of the charter itself?

A. As I said I primarily wrote this charter in consultation with all those people, but prior to it being approved by the board and in fact a fundamental principle we have is that the board would not approve it unless that process had been followed. I should add that the process to develop and approve this charter was, from memory, about six to nine

months. This wasn't something I wrote late one night and had approved by the board the next morning.

Q. And I move then to the third area that I mentioned to the Commission, are you aware that under the Underground Mining Regulations, regulation 10, there has to be accident notification made to the inspector about certain events underground?

A. I'm sorry I'm not aware of the specific regulation number, but I certainly believe that to be the case, yes and there are criteria under which notification is required.

Q. Now the questions I'm going to ask of you, I'm not directed at Spring Creek or its processes, they're directed to find out if I'm correct in what I'm being told about the incidents, the response that Solid Energy received from the inspectorate in relation to the incidents themselves.

A. I understand.

Q. I am told that on the – and these are all post Pike explosion events, on the 29th of April this year, a Friday, was there a road haul vehicle fire, RHL913?

A. There was a fire in the main drift, the men and materials drift involving an LHD, a load haul dump vehicle, I can't recall whether the date was the 29th of April, sorry, but I think your statements correct, yes.

Q. It happened underground in the main drift, as you say?

A. Yes.

1110

Q. Am I correct that it wasn't until the Wednesday of the following week that an inspector, a mines inspector, Mr Poynter attended as a result of notification from the company, notification was made earlier, he didn't attend until Wednesday 4th May?

A. Yeah, look, I'm sorry, I'll have to accept that. I don't know the dates on which notification occurred to the inspectorate or the dates on which the inspector attended. I will certainly state my clear expectation and I'm sure it occurred in this case that as soon as my management was aware of the incident it would've been notified because it was certainly a notifiable incident. When inspector attended, sorry, I don't know.

Q. You can't tell me whether when the inspector attended the vehicle had been hauled out of the drift and was in the workshop and had been stripped down already?

A. I don't recall that I would precisely, given that it was in the main drift, then it would be very unlikely we would have left it there because clearly it would've obstructed production for the entire mine. There would be no reason for it to be left there. The typical procedure in the case of a situation like that is the vehicle would be locked out and unable to be used until such time as an incident had been logged, mine management had been notified and a preliminary investigation had been carried out including assessment of the risk around that vehicle at the time and around the risks associated with removing it. Once that had been done, if the risks were judged to be acceptable to withdraw that vehicle from the mine, then that would occur. I'm sorry, I don't know whether there's a regulatory requirement for it to have stayed in place until the inspector had visited. If that's the case then, and you're advising me that it wasn't, then I'll accept that but I don't particularly know that that's required.

Q. Do you know whether in for example, comparable jurisdictions, the UK and New South Wales and Queensland, a vehicle that had had a fire like that is required to stay in place until the inspectorate have seen it?

A. Sorry, I don't know that.

Q. The next incident, 6th of May 2011 on the night shift a road header being used, S200, the cable flash, a high voltage cable flash. Are you aware of that occurrence?

A. Yes I am.

Q. Notified to the inspectorate?

A. I can only say if it's a notifiable incident then it should have been and I would be almost certain that it would've been.

Q. High voltage cable flash, potentially highly dangerous, isn't it, particularly if it's in the presence of methane gas?

A. Sir, I need to just explain and clarify, the incident was logged as a, I believe it was a shuttle car reversing out of a working place and a

worker noted a flash on the rib somewhere near the cable car. I don't know if an investigation – I haven't read the final investigation report but that was immediately noted as a significantly concerning incident of an ignition event that it was immediately triggered a stand down and investigation. I would also note that the additional question that was being asked about methane is actually a different question because to have a methane and ignition triggered event you require a combination of circumstances to occur together, which are, I'm sure everybody's aware of.

Q. I accept that, sorry I was (inaudible 11:14:14) things.

A. Okay.

Q. That particular incident I am told, and I'm asking you whether you know, that the inspectorate did not attend?

A. Once again, I'm sorry, I don't know.

Q. The 19th of June 2011, a Sunday night shift, a similar cable flash incident with a CM, continuous miner, 003, a high voltage cable flash. Are you aware of that one?

A. In fact when I said before I was aware of it I may well have been thinking of this incident. I may have confused the two, but I certainly am aware of this one which was logged as an incident, according to my record right in front of me on the 20th of June.

1115

Q. The inspectorate notified?

A. If that's our procedure and it's a notifiable incident then I have no doubt the inspectorate would've been notified.

Q. Do you know whether the inspectorate attended that particular incident?

A. No, I'm sorry I don't and it may well be simply worth making the point here that I understand whether or not the inspectorate's visit it is an absolutely fundamental issue for the industry, however I also would make the same point at the same time and I think this perhaps is relevant to the reason we're here is that I view and Solid Energy views it is the company's primary responsibility in all cases for safety in every way, however it is important that there is an informed capable

inspectorate able to support the company so I'm simply wishing to make the point that whether or not the inspectorate visited would not be a primary concern for us. That would be an inspector's issue. Our point is to make sure we report, investigate and learn from every incident and move forwards which I think you appreciate.

Q. The point inherent in what you're saying is for an inspector, for it to be operable it's got to be well resourced both in monetary and (inaudible 11:16:58) manpower terms.

A. There's probably a parallel which is that I pointed out yesterday that safety is the result of three things coming together, people, assets and processes so I imagine in the inspectorate's case it's the same three things, must have the right capable people who understand and are doing the right job. They must have processes that require them and inform them to do that and they should have the assets available to them to do that which presumably includes financial resources and the ability to get to a site in a timely manner. I'm not able to comment on any of that but I think that the parallel outside and inside a mining company is actually pretty, pretty strong there.

Q. The fourth incident, 29th of June 2011 Wednesday 8.20 pm a frictional ignition in the, when one of the development (inaudible 11:17:59)?

A. 29th of June, I'm not sure if I recall that specific incident. Once again yesterday I reported in the last four weeks, just as I would expect Spring Creek Mine had reported seven hazards and three incidents, none of which had any actual consequences for safety so we report hazards and incidents all the time, I expect that will happen and I'm sorry this isn't one that I actually recall.

Q. The 29th of June, just a couple of weeks back.

A. Yeah, if, if you give me a little more information on it I may well be able to follow up.

Q. All I can say that it was a, I've been told a McConnell Dowell operator had been cutting stone –

A. Sorry, okay I do recall that now. It was the date that was –

Q. – resulted in a flame something described to me as six foot high and four foot wide.

A. All right, it was the date that was troubling me because the date of our actual report may well have been the next day by the time it got logged in the system so now I do know which incident you're talking about now, yes.

Q. Notified to the mines inspectorate?

A. I'm, I'm absolutely certain it would've been.

Q. This time do you know whether the inspectorate came, Mr Firmin?

A. Again sorry I don't. I know that our – we have a major investigation underway of that incident. Whether the inspectorate is part of that or has attended I'm sorry I don't know.

Q. My information that Mr Firmin came on the 30th of June the day after and put a prohibition notice on the use of the particular vehicle itself?

A. That's probably consistent with what I would expect. I note that our internal investigation by that time had already locked that vehicle out so that prohibition notice was on top of a lock out under our own investigation and my understanding is that irrespective of a prohibition notice we still have that vehicle locked out.

1120

Q. Just on that vehicle, was that vehicle that was seen as being non-compliant to safety standards?

A. No, my understanding and the investigation is still underway, so I would like to stress that this is preliminary, is that the vehicle itself was compliant and we have rigorous checks of the vehicle, but the water sprays may not have been adequately functioning at the time, which may well have been because they were clogged, I don't know, and that's what our investigation is intended to find out. So, I'm sorry I'm not able to answer the question more fully than that.

Q. The suggestion made, and I relay it to you, that this in fact was a non-compliant piece of machinery that was operating under some sort of exemption?

A. I'm sorry you obviously have information from our final investigation that I don't have because to my knowledge that file and investigation is not complete.

THE COURT ADDRESSES MS MCDONALD – MATTERS ARISING

THE COURT ADDRESSES MR WILDING – CROSS-EXAMINATION

CROSS-EXAMINATION: MR DAVIDSON

Q. Dr Elder, I guess like many people involved in this enquiry you've had dealings with Harry Bell over the years?

A. Yes I have.

Q. And he's to give evidence in Court today and part of the evidence that he's giving relates to the sampling he undertook at Pike River, of coal, his comments about the sulphurous nature of the area in which he took the samples and some conclusions he reached about the ability to extract good quality coal from this resource. Have you read his evidence in that regard?

A. I'm generally aware of what you're saying, but no I have not read his specific evidence in detail.

Q. The reason I raise this topic with you and before the Commission is that in your evidence yesterday and I'll simply refer to the fact of your paragraph 74, which is at the Commission reference as taken under Solid Energy's documents 1/27, that when you took the coal or looked at the resource available at Pike River, you had reached the view that it was likely at best to qualify it as semi-hard coking coal. That's the view you reached?

A. It is yes.

Q. And then in 2010 you agreed to market 20,000 tonnes of the coking coal on a transparent pricing basis and you had to sell it at much lower semi-soft coking coal prices?

A. Yes and I do need to clarify that there is a difference between semi-hard which we believed it to be in general, and semi-soft a lower grade which it was finally sold at and that difference was probably due to the fact that it was a small one-off parcel from non-producing mine at the time. So, I don't think the semi – lower semi-soft value should be necessarily attributed to the quality of the coal, but the semi-hard assessment certainly should be.

Q. The way you expressed it was that, "On average the Pike River coal was likely at best to qualify only as semi-hard coking coal." Put that way

it suggest that that's the upper band which it might reach and thus would influence the price in the market?

A. That's correct and there's a wide range of evidence and reasons why that is the case.

1125

Q. Just to put my question in context, you have given evidence about the tension between the planning for a mine, the extent of inquiry before development and extraction takes place and the impact of surprises that may occur and influence the very conduct of the mine itself, including safety?

A. Yes.

Q. Now I just want to get an understanding before Mr Bell gives his evidence, if this was coal of the kind you describe, so at best semi-hard on average, I think you meant that there would be pockets of potentially high quality coal?

A. Yes.

Q. We're talking about, are we, something that's measured by the swelling index for coal?

A. In part there are a significant number of specifications that go to valuing a coal and swelling index or related parameters are indeed an important one of those but by no means the only one, yes.

Q. Well, the swelling index is in some way relevant to measuring the coking quality of coal in some way?

A. Yes it is and I probably needed to be clear, I am not a coal quality expert but I am certainly generally and broadly very familiar with the properties that are important in establishing the value of the coal.

Q. The reason I want to raise this topic with definition at this stage is that when Mr Bell gives his evidence, I hope on a favourable response to my request for supplementary question, he describes the West Coast coal seams and therefore coal composition broadly in this way and I just want to take you to it briefly, that in the runner up a seam, in that category quality of coal, he will put Dobson and Eightmile Valley as at the top of the range as coking coals, and I better be complete with my

question, in conjunction with, curious though it may seem, the lower Rewanui. Do you know enough about the whole areas, he spent his whole life here of course, to comment on that?

A. I would never dare to question Harry Bell's experience on the West Coast but I'm generally familiar with what you're talking about and I'd also note I think I'm right in saying there is another significant well known deposit of the Brunner seam coal which is at Stockton.

Q. Yes, the reason again it's been raised is this, that he will put Pike in a category below the Brunner upper seam, Dobson and Eightmile Valley and into a category of the Donnolly's the Tiller's Black Reef mine, the Brunner mine, not the upper seam, and Pike into that broad category?

A. I'm sorry, I'm not familiar enough with most of those mines to be able to express an opinion on that, I can if you wish express an opinion on it related to the Stockton coal which I am familiar with.

1129

Q. Well just do that then briefly please?

A. Yep, if I'm correct that the Stockton Coal is also a part of the Brunner measures and the Brunner seam and I'm not certain on that but I believe it to be so then that was one of the reasons that Pike River and its former CEO Gordon Ward often said publicly and to us that the Pike River Coal was comparable to Stockton Coal which of course is a premium hard coking coal in the world market. However, what I know about the Stockton Coal is of course there are a number of different grades of the Stockton Coal and the Pike River Coal based on its specifications was never, in our view, anywhere near the quality of the premium Stockton hard coking coal and that view was confirmed by coal technologists inside and outside Solid Energy and by customers in the market to us.

1130

Q. So you've really moved to the point that I raise in this issue that Mr Bell will say that in finding a place for Pike coal, it accords with your assessment on average, as he understands the material now presented to this Commission, but to describe it as a top class coking coal would

be wrong and that it's more in, and his using the language of his time, a thermal coal?

A. Yeah, I do need to provide a little more information to answer that because in principle the answer is yes, but I think to be fair it's important to note that the Pike River coal has some characteristics that would be consistent with a premium hard coking coal. It has other characteristics that would, such as – well I won't go into the details, I can if you wish, but other characteristics that would reduce its value. There was a plan for a washery at Pike River; the view in the market was that the original specification given by Pike for the coal as a premium hard coking coal was unlikely to be achieved. The revised coal specification provided to us in 2010 of the coal we were provided with, was significantly inferior to that and our understanding is that – and that of coal technologists in the market is that Pike River was never able to achieve their original specification and as a result that really did confirm that even with the washery in place, the coal was unable to achieve even the mid range or at least the coal that we were provided with in 2010, did not even achieve the mid range of the semi-hard category but it did make it into the bottom end of that range.

Q. And that takes us or takes Mr Bell, I put to you finally, to the question of extracting that very good quality coal from that more sulphurous coal, doesn't it?

A. Yes it does and one thing we never understood, but we assumed that Pike was solving this, was the separate extraction of different qualities of coal and I understand in their prospectus, for example, and previous documentation they planned to separate different qualities of coal when they were mining. Hydraulic mining of course for extraction is not a technique that enables coal to be segregated during the mining process, so we assumed that they had some technique that we were unaware of that was going to achieve what to us looked very difficult.

COURT ADJOURNS: 11.33 AM

COURT RESUMES: 11.54 AM

LEGAL DISCUSSION (11:54:40) **– ADDITIONAL BRIEF OF EVIDENCE**

CROSS-EXAMINATION: MS TREGONNING

Q. Dr Elder, you've previously been asked about the shipment of coal which you sold on behalf –

A.

THE COURT ADDRESSES MS TREGONNING – HARD TO HEAR

CROSS-EXAMINATION CONTINUES: MS TREGONNING

Q. You've previously been asked questions about the 2010 one-off shipment which you sold on behalf of Pike River Coal (in receivership). Do you remember those questions?

A. Yes.

1157

Q. Are you also aware that Pike River Coal had sold two shipments of coal prior to November 2010?

A. I couldn't have said two, but I was aware that it had sold a shipment, yes.

Q. You've got no reason to disbelieve me –

A. No.

Q. – if I tell you it was two? And are you aware that they were sold as, "on average hard coking coal quality?"

A. I would have to ask whether you're asking me whether I'm aware they were sold as premium hard coking coal or semi-hard coking coal because both are varieties of hard coking coal.

Q. I believe that Mr Whittall or Mr Dow will give evidence in due course that they were sold as on average hard coking coal quality. You've got no reason to, to disbelieve that evidence?

A. No I don't, but again I emphasise that my point was about the distinction between premium hard coking coal and semi-hard coking coal, so whether they're sold as hard coking coal is less relevant than the distinction.

Q. Are you also aware Dr Elder that Pike had contracts for 70% of its production over the next three years at which the level of coal quality was hard coking coal?

A. I'm aware that I believe its Indian shareholders had contracts for most of that coal. I don't know what the specifications were and again the distinction between hard and semi – or premium hard and semi-hard is important and I also note that those shareholders declined to take those trial shipment – sorry that 20,000 tonnes when they were approached for us to market them and we were surprised at that, but they said they were not interested in that coal.

Q. That was a one-off shipment that you're talking about there?

A. It was indeed, but they should've been amongst the first people to take that coal. We would've expected and when they didn't we believe that confirmed our view of the coal.

CROSS-EXAMINATION: MR WILDING

Q. Dr Elder I'd like to take you to paragraph 12.1 of your witness statement and that's summation number SOL306956_1/6. And if you'll permit me to paraphrase please but at paragraph 12.1 you essentially say that, "Open cast mining at Pike River would not have been economic."

A. At the time the mine was planned, that's correct, yes.

1200

Q. Are you able to please explain the factors that meant that at that time it wouldn't have been economic?

A. Yes and if you'll permit me just to provide a general background to that as well, the seam at Pike River is in general in the location that it was being mined of the order of 100 metres deep or so, I don't recall the exact seam thickness which was undoubtedly variable anyway, so the stripping ratio, in other words simplistically the amount of overburden or rock and soil over the coal seam divided by the thickness of the coal seam was of the order of 10 to one or probably significantly more than that, so in the area of – and that would be comparable all the way up to the outcrop where the overburden ratio was well understood, so what

that simply means is that you have to take a lot of overburden off the coal before you actually get to the coal seam. That costs and the higher the strip ratio the higher the overburden ratio and the greater the cost. At the time the mine was originally planned and irrespective of the previous discussion about the difference between different grades of hard coking coal, the prices in the international market, and I'm talking 2000 to 2005, prices in the international market for hard coking coal were of the order of 50 to 75 US dollars per tonne. At that time, and at no time between then and now, would it have been possible to open cast mine coal at a strip ratio of 10 to one in that geography and geology at a cost below US 75 dollars a tonne, which of course was an FOB price, Free On Board price at Lyttelton and therefore also had to cover and include the cost of transportation.

Q. Now, you've referred to the cost of stripping, is there also a cost associated with remediating the land after the expiry of the coal extraction?

A. There are a number of additional costs as well, the stripping cost is, if you like, the immediate variable cost but all infrastructure costs in advance, planning design costs and all costs at the end of the mine life have remediation rehabilitation and the like also have to be taken into account.

Q. In your view would it have been economic for at least part of it to have been open cast?

A. Not at prices at that time or through to about 2006 when I'm sure most of the planning was done, not in my view, no.

Q. If I could take you please to paragraph 21.5 summation document ending 12 and you say there that, “Most easily accessible shallower high quality coal on the West Coast has already been mined over the past century.” Having regard to that are you able to express a view about whether there is a role in the future for underground coalmining on the West Coast?

A. Yes but it’s a very generic view which is that there is a role in the future for both underground and open cast mining on the West Coast and the

factors that come to play are a combination of the cost to mine, the price in the market and the other factors such as safety and environmental that need to be met along the way.

Q. Are you able to express a view about whether there's a role in future for underground mining in New Zealand aside from the West Coast?

A. Yes I think there's certainly a role for underground mining in the future in New Zealand.

Q. One of the chronologies suggest that there has been a trend from underground coalmining to open cast coalmining and that as at 2010 only about 25% of coal production in that year was mined by underground methods. Are you able to give any indication as to whether or not, in your opinion, that increasing trend towards open cast mining is likely to continue?

A. Sorry, can I just clarify, is that a global trend you're referring to?

1205

Q. That's a trend just within New Zealand.

A. Within New Zealand? So I think it's, I think that trend is clear but I do think it's important to note that New Zealand only has a very small number of coal mines by international standards so it's a very small sample size. The reason that open cast mining has mined more coal over that period is very simply that the price, the market price for coal has risen so that it has been economically viable over that period to mine coal that previously was deeper and some of our mines are very good examples of that. If I may just explain why that is, for example the Rotowaro and Awaroa pit at the Rotowaro open cast mine in the Waikato which supplies most of Huntly Power Station's coal is now mining at strip ratios that at their deepest are I think are approaching 15 to one or more and that is because the price of electricity, energy and coal in the New Zealand market allows that coal to be mined at that depth whereas in 2000 to 2003, 2004 when that mine was started that deep coal would not have been economic so in the course of that open cast mine at Rotowaro we have amended our long-term mine plan to say we can take much deeper coal. That of course has resulted in the

trend that you see so the short answer really is that the increasing price for coal has allowed mining of deeper coal, increasing price in the future will allow that trend to continue but it is generally, but not always, lower cost to mine coal underground but there are many other issues that need to be balanced against the cost of the mining.

Q. If I could take you to the same document, summation number ending 19, at paragraph 44 of your witness statement you said, and this is with reference to Spring Creek in 1999 that, "There had been too little geological and resource investigation completed."

A. Yes.

Q. Are you able to explain what geological and resource investigation had been completed?

A. Yes, at that time geological and resource information is a combination of drilling to identify geological structure and seam physical characteristics and coal quality information. The information that Spring Creek had in 1999 when it was opened was for a resource comparable to although somewhat bigger than the Pike River coalfield but not very much. At that time we had approximately 115 drill holes from my information. The average spacing of those was about 300 metres. One hundred and fifteen drill holes sounds like a lot and that's a lot to have invested in a mine and certainly at that time it was felt that was pretty good but a combination of that not being enough, not being in the right places, not being at sufficient density meant that we very quickly encountered a wide range of surprises when we were mining and learn very quickly that those drill holes at 300 metre spacings, no matter how many of them we had was nowhere near sufficient for us to meet the requirements of the JORC Code for example which is to have reasonable certainty about the continuity of seams between drill holes and when we were mining.

Q. What were the consequences of that insufficiency of information?

A. In the simplest terms we continued to be surprised on the unpleasant side in a wide range of areas when we were mining. We continued to run into small previously unidentified faults into zones where the coal

thinned and thickened in ways that mean mining was less, or less economic or more difficult or we had to change the detailed mine design or the coal quality changed and a combination of all of those meant that our production rates were inadequate and the mine effectively was uneconomic based on the mine layout and design that we'd progressed with.

1210

Q. Did any of those matters or the insufficiency of information impact on health and safety?

A. It's a paramount principle that safety is always first of course. So my belief is, no they did not.

Q. Did they impact on the extent to which you could develop the mine in a way that was consistent with good health and safety practices?

A. They certainly did and the compromise that we had to make at the mine at that time and from then on to the present, and still at the present, is that we are unable to mine as productively and economically as we would like because the health and safety risks that we're addressing require us to compromise production and the economics of the mine and that's a decision, that as I said yesterday, we're always willing to make and will always make.

Q. Could I please take you to another part of your witness statement summation number ending 22. Now if I could just take you to paragraph 59 and ask you just to expand on and explain the first sentence, which reads, "However unless the future cash expected to be generated from the mine with reasonable confidence is valued greater than the cash already invested the difference has to be written off?"

A. Yes, that's probably an attempt to summarise an accounting principle which has to be applied at year end every year. And if I try to express it differently it's to say, looking forward the value of the mine in future must be greater than or equal to the value that is on the books. If it is not then you have to write down the value on the books under the accounting principles, accounting requirements, so that the carrying

value on your books is no greater than the future value you expect to be able to get out of the mine.

Q. Given the net cash shortfall position of Spring Creek at that stage are you able to explain why Solid Energy decided to carry on with it?

A. Yes. There are two different components here. One is what the value of the mine is on the book, which is past historical and sunk, there's nothing you can do to change that. The other is the future value of the mine. So a decision to carry on with the mine is not about the past position, no matter how much money you may have already sunk and lost because that's gone, it's about the future value of the mine. If the future value of the mine is positive, in other words the revenue you would receive is greater than your costs and sufficiently positive, after allowing for the investment you have to make then you are justified in considering carrying on. So the position we were in at that time was we said, "We in hindsight should not be in this mine, it's cost us more to get here than what we can get out, but that cash is gone. Looking forwards the mine still has positive value we will get more in future than it will cost us to carry on mining so we were justified in carrying on forwards subject to all other matters."

Q. Did Solid Energy undertake anymore geological coal resource investigation before carrying on?

A. Yes we did. We have a continual programme of surface drilling. We do in-seam drilling. We attempt seismic surveys, which is a very good way of getting additional information. We attempt two-dimensional seismic which is difficult in that geography and a range of other techniques. And for example one consequence of that is that from 1999/2000 when we had 115 bore holes we continually progressed through today to the point where we now have between 360 and 400 drill holes in that resource. I'm sorry I can't tell you exactly which ones occurred when but it would be a continual procession of drilling those additional 300 drill hole, 300-odd drill holes during that time.

1215

Q. If I could take you please to summation page ending 33 and with reference to paragraphs 96 on the preceding page, but the bulk of it 97 to 101 on this page, you gave evidence yesterday as to organisational maturity and you referred to four levels. Are you able to explain where Solid Energy is on that scale of maturity?

A. Yes I am and I think it's important, I'll be important to elaborate a little on that. The University Queensland Minerals Industry Safety and Health Centre has established a system that is quite widely used and understood. I think it's an excellent system. The best way to characterise organisational maturity is not to look at a snapshot of the whole organisation because while that is – may appear to be useful it actually doesn't get down to the level of detail that you need to really manage safety. So, this maturity, organisational maturity approach, it's very important to note is a guide to assist organisations to understand what sort of proactive initiatives they should be taking at any point in their history. In other words, if you're an organisation at a regressive or reactive maturity level, right at the bottom of the curve, then implementing the sorts of initiatives that are appropriate for resilient, very resilient mature companies are likely to be ineffective. They will come out of the book and tell you that these are the best initiatives you can take, but if your organisation is not ready to take them then they're likely to be largely wasted. So in that regard it's important to look at each component of an organisation in addition to the organisation itself, each business area with org – in an organisation, each mine or operation within that organisation and potentially even components within that mine. So, within that framework if I can give you my answer, it's the belief at Solid Energy that we have progressed significantly from a maturity level, perhaps 10 years ago, that was – or more than 10 years ago that was not much better than regressive, through the reactive maturity level on average to a level now that I believe is probably somewhere near planned and moving towards proactive. It is certainly not at proactive yet and it is certainly not at resilient. Within the organisation, with Solid Energy I believe we have a number of different

operations that would be at the lower end of that range, potentially still moving from the reactive to the planned stage. We also have some operations that I would regard as in the proactive stage and striving to, but still a long way from the resilient phase. That would probably be consistent with most mining companies. There would be a very small number of very good companies whom we benchmark against, who I would consider are where we would think is resilient, however, when I talk to them they say, "No, they regard themselves as planned to proactive," because this is a continually moving benchmark.

Q. Is there a formal process, pursuant to which that level of maturity is assessed?

A. We do have processes in place that we have used to assess our maturity and they have included asking our employees, our staff, our management, in our mines and at our operations to carry out then own self-assessments and what's interesting and I think very positive is that when you do that one of the things that we've found is that our employees, if they are working well and very honest, tend to assess themselves and their own operation much lower on the curve than I as chief executive or our senior management would and I think that's very, very healthy.

1220

Q. Is that process one that Solid Energy's come up with or is it a process suggested by some external agency?

A. No, that entire process is based on the University of Queensland and the Queensland Minerals Industries Centres approach which is very well documented and in fact it is based on an approach that they run extensive industry training courses for, I think it's probably worth noting that the shorthand for those is G2, G3, G4 courses. These are risk based training courses that contain all this information. It's highly relevant I think to all approaches to safety in New Zealand in future because of the Queensland approach which really is a benchmark and the way in which that is carried into Solid Energy is that the G3 training course, which is I think internationally the benchmark training course on

risk management for safety and other risks, is a one week long training course. We have now run I think pretty close to 100 people in Solid Energy through that course and many more through the shorter G2 and G4 courses and the gains in understanding knowledge, processes and behaviour from doing that have been immense.

Q. When you refer to 100 people having been run through it, at what levels of your organisation were they?

A. Yes, the G3 course generally targets people from the supervisory level through to senior management, however a number of our executive management people have been through it. I myself have been through the G4 training course which is intended for executive management on the board. The G2 training course is targeted more at the supervisory level within the mine, close to the coal face, we've run many people through those courses as well. We consider that effectively an almost critical but certainly key part of our entire training.

Q. Is that level of maturity ever externally reviewed?

A. Two answers to that and in both cases the answer is partially. The training courses do include an element of assessment at the end by the external trainer, so this isn't simply go and sit there for five days, it involves a lot of hands-on practical work and assessment at the end of that and certification or effectively issues of a certificate at the end of that. The second way in which it's externally reviewed is we have continuous, I shouldn't say continuous, regular external assessment in auditing of our safety in Solid Energy and many other processes by independent external experts right up to and including at board level and we have an external advisor to the company who is an advisor to the board and myself who is an internationally acknowledged safety expert and who also plays a similar role with some of the world's major mining companies and that person for example, provides very direct and specific assessment of where Solid Energy is and what we know and much more importantly perhaps what we don't know that we don't know and perhaps for the record I ought to state the name, it's America's

Professor Jim Galvin, who I think will be well known to many of the people in the industry.

Q. Are you able to briefly outline the process followed by those external assessments?

A. I don't believe we are yet at the level where we are providing on a consistent and highly systematic basis the level of external review and assessment of our progress along the maturity curve. We have done it to date on a more ad hoc and informal basis recognising that our focus at present is on improving rather than measuring where we are.

1225

Q. To what extent is the board's view of health and safety and any issues that arise in relation to health and safety fed back to the employees at the coalface?

A. To a significant extent in a wide range of ways. They range from board visits, inspections and, at mines and those visits and inspections usually include a component where the board is carrying out independent observations and reviews which are documented and fed back to management and to mine personnel right through to the board obtaining and receiving independent audits or safety processes at the mine which are reported to it, which it then discusses and reviews with management and expects to be provided back to the mine, obviously as a routine part of the process. And on a number of occasions the board specifically asks me and the senior management team to convey specific messages to the mine or to mines or to operations and has a direct line of sight with, transparent line of sight to receive some very significant and similar information on incidents, for example, to that that I've described I received and they have the ability to, and regularly do, request that management from mine operations attend at, for example, the board health and safety, Health Safety Environment Committee to discuss specific incidents, to review investigation reports and at those meetings specific feedback from the board and members of the board back to management occurs and is fed back directly to other people at the mine. So it's quite broad and very specific as well.

Q. So at a practical level what's the role of employees who work in a mine in health and safety?

A. There are obviously a range of roles. They start with training so that an employee in the mine understands the environment in which they're working. And perhaps I could refer to clause 93 in my evidence. So training so that the people understand the environment in which they're working, 93.3, the processes they're expected to follow, which in general are standardised and they're required to comply with, 93.4, and understand and are trained to use the equipment they're working with, 93.5. So those are the three key elements I would say but in addition to that obviously, as I've said a number of times, any employee, and this is in our board approved delegated authorities and stated clearly any person in the company has the authority at any time to stop a task, stop a work process, or if necessary stop an activity or even an operation if they believe there's a need to do that for the sake of safety, risk to safety but also risk to the environment or key risks to assets, for example, and those occasions can and do occur. So the role of an employee is quite broad. There are no limitations on employees, in my view, that would prevent them from complying with our safety principles, our safety policy statement or with the requirements and obligations on them under either our internal policies and systems or statutory requirements.

Q. Would it be fair to say that for an employee to be able to perform that role, for example to stop a task, then there has to be a culture within the company which essentially allows that employee to do so without any concern?

A. It would be absolutely fair to say that, that's a fundamental part of that, yes.

Q. So how is that encouraged?

A. It's more than encouraged, it's required and expected under our policies and as I noted previously it's stated in a range of our policies. It's a part of our training process. It's encouraged in two ways. First, through positive reinforcement which I believe in fact now occurs when an

employee does something like that and, second, in the reverse an employee who doesn't actually follow that is in breach of our safety requirements and other than a range of other investigations related to an incident can be, and generally will be, subject to disciplinary processes so it goes both ways and that's not just about staff and face workers' employees, that's anybody up to and including myself.

1230

Q. In your view is it possible to measure that culture?

A. Culture is a very difficult concept to measure but behaviours which are in some definer culture are perhaps the better way to consider it because you can identify what behaviours you expect. You can observe those behaviours and you can compare them to expectations, monitor them, record them, report them and do something about them and if I put that into a slightly broader context the world of safety for many years was about tracking what we call lag indicators such as the number of accidents, the injury rate in a given period of time and so on. As you become a more mature organisation you focus more and more on lead indicators. Lead indicators are the indicators of things that could potentially cause safety risks if not addressed and many good lead indicators are behaviour based. The best example I can give you is are people reporting hazards as they are seen in the mine or are there many unreported hazards. One of the single most important lead indicators is are they reporting hazards as they occur? Are they reporting them accurately? Are they doing something about them and are they followed up? And as I've said we have reports of very many hazards in a great deal of detail, some of which probably people would say look trivial but they never are.

Q. Can you just give us a few examples of some hazards that you say might look trivial but perhaps aren't?

A. Yes, I will. Let me think if I refer, as I already have, to a quick examination of the hazards report at Spring Creek in the last month, one of the hazards reported was by an employee was, the roadway appeared dry. Now on face value roadway appearing dry might well,

might well look like something, well that's actually probably going to make life a bit easier and there would be plenty of people who would say, "A dry roadway that's good, that makes my life easier," but in fact, and I don't know who the employee was reported it but the employee reported that knowing from their training that in fact a dry roadway is an indication that there's potential for coal dust and there was a need for some action to be taken, whether it was to provide water, whether it was to remove coal dust or provide some stone dusting on or around the roadway so that would be one example. The second example I see here would be a missing hacksaw. This came through to my email that somebody had said they went to a toolbox to find a hacksaw and there was no hacksaw. Now you'd say, hacksaw missing, that probably happens at home every day when you go to the garage and your son's been at it, but in fact the reality is that a person looking for a hacksaw at some point in the future might be looking at it, looking for it because they need it urgently for a task related to an urgent safety action. If it's not there there's a reason for it not being there and it should be there so that was reported as an incident and the employee who reported it, reported it as an incident that could have a high consequence and I would support that.

Q. I'm going to return to the data shortly, but can you just answer this? If we take the example of the dry roadway, for that to be reported it relies essentially on there being sufficiently trained and experienced staff to understand that that might be a hazard?

A. Yes, but could I add it also requires, back to your further question, it requires the behaviour to be exhibited which there's that I'm not going to ignore that. I appreciate that that's a hazard and I will report that even though that might reflect on my mate.

1235

Q. Given the importance of suitably trained and experienced staff is there any particular ratio of experienced to inexperienced staff that Solid Energy would consider appropriate in a mine?

A. Ideally it would be an infinite ratio of experienced to inexperienced. Of course that's not reality, I don't think there is an absolute ratio, I do believe each of our mines has considered that issue and considered how many trainee mine workers they believe are appropriate at any given time in the mine as a total and also how many trainee mine workers and a trainee mine worker may be for a period of a number of years, not just the day they arrive, how many trainee mine workers you would allow to be in a given crew on a specific shift surrounded by more experienced mine workers. I'm sorry I don't have the specific numbers at hand because this is a judgement thing, we would expect each mine to provide based on the specific work tasks being carried out.

Q. I presume that's information that Solid Energy would be willing to provide at a later point?

A. Yes, again if I could just confirm what I've said though, that is probably a moving number that's a judgement at the time ongoing as opposed to something that would be set in a policy statement, that would be a judgement applied at the time under the mine's specific management system.

Q. Your report referred to gathering all this information about behaviours and in particular hazards being reported. How is that gathered?

A. In a range of different ways. The first and perhaps the most important one is that when any activity is being conceived conceptually and planned and this might range from the planning for an entire new Greenfield mine, through to the daily or hourly planning of a new task that has to be carried out, then our procedures and systems expect there will be risk assessment carried out as a part of that and that's a part of our approach that I think I've described before. So, that risk assessment focuses and uses a range of specific tools to do this on identifying the hazards that could occur in the future if the decision was made to progress forward with that activity from a new mine through to a task. Then as the task is approached there will be a series of specific risk assessments that will become more and more specific. As I come now down to operations and specific task activities there will be task

specific risk assessments carried out and a job specific risk assessments carried out particularly where there is any change from previously – from previous operating conditions, the environment, the work process and the like, and change is a particular trigger for carrying out risk assessment. These go right down to, for example, what we call Take 5s, which is a concept very common in the industry where all our employees and I have my own, although I don't have it here with me today, a Take 5 booklet. A Take 5 booklet is nothing more or less than a very simply little book you can carry around in your pocket that summarises that risk matrix I showed yesterday, summarises the sorts of hazards you might expect to occur, has the statement that you're expected to follow of health and safety policies and procedures, but then a simple little sheet about, about that sort of size, which has room to identify what am I about to do, what are the hazards or risks associated with this, what might the consequences be, what am I going to do about that and is it okay to continue or do I need to do something else before I carry on. Those books and then hazard – little hazard forms that are exactly the same, are carried around by employees all the time and if you see a hazard such as a missing hacksaw, all you have to do, assuming you assess it as not something that needs to stop the operation around you, quickly pull out your note, jot down, hacksaw missing, time, date, reason, issue around that, assessment of risk and then you pass it to your supervisor and it's passed on from there. So there, there's a range of ways all those things occur from big picture right down to minute detail.

1240

Q. And those hazard reports for example, the Take 5 Hazard reports from employees, are they then gathered together centrally?

A. Yes they are which is why we – a central repository, we have a system called impact which is simply the brand name of it which logs all hazards, all incidents, processes them, allows analysis of them and then automatically reports them, that's why within I think 24 hours of an employee writing a little hazard report that there was a hacksaw missing

was in my email in my folder of incident logs for the day and why I was aware of that.

Q. When an analysis is being conducted of those what are you looking for?

A. Obviously a wide range of things, but in particular you're looking for patterns, so you need to be able to group information together to identify where are trends or where is information that's particularly useful to you so one of the first things you're looking to do is to be able to categorise hazards or incidents into a range of types and we would have 15, 20, 30 categories for underground mining, you can have as few as five or you can have as many as several 100 if you wanted, but that's an appropriate number in our view. So, you can then see how many incidents of a certain type you are having within each category. When you see those you're then looking for some specific things and this is a very important learning from our journey in safety if you like. You're looking to see where are there repeat incidents of a certain type, because repeat incidents of a certain type that have a significant safety risk are an indication that we didn't learn last time and we've managed to allow this to happen twice without doing something about that. That is obviously a behaviour and a cultural signal but it's also an indication there is a specific issue with that activity, that hazard that needs to be addressed because sooner or later if it carries on it might occur in such a way that there are consequences rather than no consequences. The final step, and this is a very significant learning for us, is to look at repeat incidents of a specific type and identify repeat incidents that are also what we call zero barrier incidents, and if I can just explain what that means because this is probably getting a bit specific, would you like me to carry on?

Q. No, please carry on.

A. Can I perhaps ask people to imagine the concept of a bow tie, that's the easiest way I can explain this and this is a standard industry concept and again it's part of that risk assessment work from Queensland. Imagine at the left hand end of a bow tie you've got all the range of hazards that you could find, you're always looking for them, they'll

always be there, you're continually trying to eliminate and reduce them but there will always be hazards. Several steps through that bow tie, each of those steps represents a set of measures you can take, initiatives you can take or controls you can put in place to eliminate that hazard or to prevent it occurring, staying in place in such a way that it can actually lead to an incident, so what's an example of the difference between a hazard on the left hand end of the bow tie and an incident which is the knot in that bow tie. A hazard at the left hand end may be something as simple as, let's see, a roadway that is becoming dryer. A series of things you can obviously do to prevent that, as I've said before, from making sure it stays wet to making sure there's no coal dust in place, excessive coal dust around it to making sure all your stone dusting which is applying lime to prevent coal dust being accessible in the case of an explosion, all those things can be done. They represent steps up to an incident. The incident would be – so that's the hazard, the incident would be if all those controls have failed and in fact there is now some event occurs, perhaps with a small source of ignition or it may be related to bogging down of a piece of equipment, so not just safety related, where something happens and you're now at the knot in the bow tie, there's been an incident where the barriers and controls have failed.

1245

A. That's not the end of it because now you have to ask what the consequences of that are. So after you have an incident you move out the right-hand side of your bow tie where progressively there should be in controls and place to prevent incident having consequences that could get progressively worse and worse, whether they are safety, environmental or related to production or assets. If all those controls progressively fail the bow tie gets bigger, the consequences get worse and eventually you can end up with catastrophic consequences. So the bow tie is a very good way, which we talk about all the time, to imagine the things you need to do and to review and document and control the things you need to do to prevent a wide range of hazards, eventually

leading to an incident, which then leads to consequences which progressively worse and worse.

Q. You referred to repeat incidences. When you have a repeat incident does that cause you to inquire into the circumstances that gave rise to it and in particular with a view to whether or not, for example, the practices or design of the particular operational system are right?

A. In fact more than that. You don't need a repeat incident to do that. Any incident requires an investigation, not just a repeat incident, and the nature of that investigation will, is specified and will depend on the nature of it and the risk. A repeat incident is much more than that. It's a clear signal that the investigation of the previous occurrence of that incident didn't result in changes in controls or behaviour or process to prevent that occurring again by definition. So the repeat incident investigation would investigate not only why it occurred but also would step further back to say what failed organisationally to prevent that, that would've prevented that occurring twice.

Q. And just to clarify, when you say, "instant", am I right in inferring that that is a broader category of events than accidents that have to be notified to the Department of Labour pursuant to the Health and Safety and Employment Act '92?

A. Very much broader. Perhaps I can give a more simple example that's probably easier for us all to understand. A four-way intersection in a city, in a town, represents a hazard, it represents the hazard that two vehicles may be in the same place at the same time travelling at speed and will have an accident. So that is a hazard. There are various controls in place to prevent that. One of them is simply road markings and Stop signs in driver training. So if a person comes up to a Stop sign and drives through it without looking and without stopping that hazard has now become an incident because they have breached a range of controls, that last barrier is removed, there is now nothing to stop an incident occurring. The question of whether there's a consequence to that depends on whether there now happens to be another vehicle coming along who expected that driver to stop and turned out to have

their vehicle in the same place a the same time. So that's perhaps an easier way to understand the difference between a hazard and an incident.

Q. Would I be correct then in assuming that the category of incident to which you've referred is also broader than the category of accidents which have to be recorded at the company's office under the Health and Safety and Employment Act?

A. Very, very, very much broader. I would, I suspect based on our own records, I don't know the exact number but I think I can make a good estimate, that we would record probably hundreds if not thousands, many thousands, of hazards and many hundreds, if not thousands, of incidents for every incident that actually has consequences that would require us to report it. And it's my expectation that we would be doing that all the time.

Q. Are there industry statistics regarding the level and type of incident that might be expected in underground mines within New Zealand?

A. Are there industry, sorry can you repeat the question for me please?

1250

Q. Are there industry statistics regarding the level and type of incidents that could be expected in an underground mine in New Zealand?

A. Internally in Solid Energy we would have now a very good database of these. Probably I need to note that historically we've been about 80% of the production in the industry so the industry database is probably not that good because there simply haven't been enough mines in New Zealand recently with current mining methods for that to be well compiled but I may well be wrong on that and this is not intended to be any implication for what does or doesn't exist, I'm simply not aware. Our approach though is to say we need a very broad data set for those statistics so we regularly go to Australia or internationally and the Australian data set reporting, and information of course is very good, need to express a note of caution regarding bringing data from Australia to New Zealand for our specific conditions but that having been said in general the learnings are very good and our belief would be that tapping

into that is probably the most valuable way to get additional information outside our own internal database.

Q. I ask because one would assume that if there was a discrepancy between the level of the nature and types of instance that might be expected in the industry and those being reported within Solid Energy that that might be an indication that something's not right. Is that a fair comment?

A. I think it could be, but again I would have to caution it's a very small number of mines and therefore a very small data set so the statistical validity of drawing those conclusions you would have to look at carefully before you drew a final conclusion but in principle I suppose they should be correct.

Q. Well if we take an example. If from one of your mines there was a significantly low level of reporting of a particular type of incident than those which you would historically expect, would that cause you to question why?

A. It would and it does, yes.

Q. And so do you analyse the reporting data to see if there is such a discrepancy?

A. Yes, we do on a regular basis.

Q. And what happens if a discrepancy's identified?

A. It would obviously depend where it's identified. There's a great deal of communication occurs all the time between different operations and at management level, but if it were identified for example at the executive or board level then very likely the first person to be asked the question would be the National Manager of Health and Safety who would be asked to explain the data, verify our understanding of it and assuming that our gap was correctly confirmed then the National Health and Safety Manager would then be asked to go away, investigate it, and report back on that to us and also to follow up on why that occurred and to provide an action that needed to be implemented to address it.

Q. Can you perhaps return to your witness statement please and summation page ending 34? If I can direct you to paragraph 103.2

please, you've said that hydraulic mining is a method that is not common and introduces an additional set of risks. Can I ask you two questions, and the first is, an additional set of risks compared to what?

A. An additional set of risks compared to in particular mining using the conventional mechanised mining approach, using continuous miners would be the most obvious response.

1254

Q. What are those additional sets of risks?

A. Yes, there are a range of them and I think I have discussed them earlier in my evidence but the first set of risk is simply the risk associated with doing something differently that has not been done so many times in such a wide spread way before that every aspect of it is well understood, that's a standard principle in all safety, not just in mining, not just in underground mining, that when there is a new process or a process with which everybody is not completely familiar, then by definition there are almost certainly additional risks. So that's probably the first comment on that and hydraulic mining is not a common method internationally and there is not a widespread body of expertise on it nationally or for that matter even in New Zealand notwithstanding that it's being used in a number of locations in New Zealand. The second risk is more to do with the process and the geological environment itself. Continuous mining using a mechanised miner is designed to provide, as I said yesterday, call it a tunnel, a minimum sized tunnel which may have a range of different roles or types, simply to get people, equipment and infrastructure to the end of that, end of that to a location where you're extracting coal back. So because it's designed to be the minimum possible size and in fact the less coal you can take out while doing that the better, it has relatively little impact on the environment around it, so it has a set of its own risks, but they are actually relatively well understood and managed. Hydraulic mining in the extraction process is almost the opposite of that. Your intent is to take out as much coal as possible and leave as little as possible behind, consistent only with the safe mine design that you have. So, by definition you're

removing every bit of support to the coal seam, support to the location that you're working at as you're moving backwards from the location of extracting coal. You're expecting the roof to collapse after you've removed the coal because it no longer has support and when that roof collapses, first you need to ensure its collapsing well away from and after you've left that location and second and this is particularly important I think, when that roof collapses you're now freeing up any and all of the gas that was available in what coal remained to suddenly be rapidly expelled into the, the space and expelled out into the working place, into the tunnel that accesses that place and in a relatively uncontrolled and sudden manner which, which does occur with hydraulic mining. So, you need a very, very different set of controls particularly for gas management and ventilation to make sure that rather than just dealing with very slow steady progress in mining coal and generally slow steady gas output from the coal ahead of you, you're actually able to deal with a very big large sudden unexpected and surges of gas that can be difficult to quantify. That's a major risk for hydraulic mining that is quite difficult to assess.

Q. In that same paragraph you've talked about requiring highly specialist expertise. I'll ask you two questions, first can you outline, just briefly the areas of expertise that in your opinion are needed to plan and operate an underground mine.

A. Yes. This is a pretty major question, so if I may I'll try and sort of start by simplifying it into groups of expertise or functions and then perhaps if I could move forwards from there to answer it in more detail and if you'll allow me just to check on some notes I have here.

COURT ADJOURNS: 1.00 PM

COURT RESUMES: 2.02 PM

CROSS-EXAMINATION CONTINUES: MR WILDING

Q. Dr Elder, before we broke I think I had just asked you to outline the areas of expertise that in your opinion are necessary to plan and operate an underground coal mine?

A. Yes, so I'd like if I may to start by separating into broad categories before I move into the specialty areas because there are many of them, but I think there are probably four broad categories of expertise capability required. The first is in the resource assessment phase which is the exploration, the geology, the geotechnical work, the coal quality assessment. The second area is in mine planning at a broad level both conceptual and then more detailed. The third is the technical specialist areas for detailed design of every aspect of the mine that's infrastructure, it's appropriate equipment and so on and then the fourth is in the operational management including the planning of all the, and design of all the processes, setting up of the standard operating procedures and systems and then management of production, management of people, management of the assets and infrastructure in the mine and safety and environmental management so those are the four broad categories. Within each of those I could continue to break it down into sub-categories and then into a detailed number of specialist areas of capability if you wish.

Q. Well if you could and perhaps if we start then with the first you mentioned which was the resource assessment phase?

A. Yes, so the resource assessment phase is about, as I said in my evidence, making sure that when you start to plan the layout and the design of the mine you have sufficient information so that at that phase you are not creating difficulties that will be difficult or impossible at any later stage in the life of the mine to address so that includes an exploration programme that obviously is eventually designed to meet the JORC categories for the resource, all the drill holes that go with that, the geological assessment, collecting information from a wide range of

sources, geophysical, visual, sampling and drill holes, assessing the coal quality and getting samples and analysis done on that, quality assessment of course of all that data, preparing resource estimates and then preparing geological and hazard plans based on all that information and then moving on from that, mapping all that together, getting a clear picture of structural geology that's appropriate for the JORC category at that stage of the mine planning and then a range of additional collection of resource information and assessment through the operational stages of a mine. And for that you obviously need exploration geologists, resource modellers with the capability to go with that, surveyors, mine or production geologists as well and coal quality specialists, coal quality geologists, and moving on from there, technical marking – marketing specialists who understand the coal quality and its value in use for a particular sale to a particular customer.

1405

Q. Accepting that each mine is different, so if we take the example Spring Creek, putting to one side what actually happened at Spring Creek how long might that phase be expected to take?

A. That's obviously to a large extent a function of the geology and the location. In a – as an example, in Queensland with a very big continuous coal seam for many, many kilometres, it might actually be relatively straight forward if the seam is very quickly understood from a small number of drill holes or outcrop information, then that information could be easily extrapolated if the information is consistent, that might be something that might take months to a small number of years to get a pretty good assessment to a reasonable JORC category. In the West Coast of the South Island in New Zealand's – in our geological conditions here, our experience is that even with intense use of a large number of drill rigs, considerable number of experienced geologists, it would be my view and I guess a hard-bitten view based on 11 years of experience in Solid Energy that woe betide us if we attempt to do that and expect that it will take probably less than four, five six years and sometimes up to seven or eight years, because you have to continually

cycle round, collect the information, assess what it means, compile your structural model, do conceptual planning based on that, identify where the issues are, identify the gaps, go back and fill them in again and compl – carry on iterating around that until you're satisfied that effectively you have a measured resource that goes out five or 10 years of future production and an economic reserve that you're able to work with.

1408

Q. And when you refer to measured resource does that mean that you would want to have a measured resource in terms of the JORC Code before you move on to that next stage you mentioned of mine planning?

A. No, sorry, the two go very closely hand in hand at that point, the mine planning process is one of using the information you've got available so you can develop a conceptual mine plan based on very early information, a limited amount of information and you'll recall the five stages of planning that I referred to at the first - the conceptual phase and you'll keep on adding information as you move through the conceptual phase through to the assessment phase, the prefeasibility phase, the feasibility phase, but you will generally be targeting moving those forwards and parallel because the consequences of not doing that is either, on the one hand, you do an enormous amount of very expensive exploration drilling and then find that it wasn't justified because you didn't have a mine plan at all, or alternatively you develop your mine plan far too early, set that in stone and don't have enough information so it's very much a balance of those moving forwards together, continually iterating them which is why the five step process that we use, and which is pretty standard internationally, is so important, you try not to get ahead of yourself in any one area.

Q. Right, so when you refer to four matters, resource assessment phase, mine planning phase, technical specialist areas and then operational management, they shouldn't be taken as setting a chronological order?

A. No, they're certainly not chronological, there's obviously a degree of chronology associated with those, the resource assessment phase is

dominant up front, but then it continues right through, the mine planning phase then kicks in and continues on from there and you're never out of that, you're always revisiting the mine planning and the mine design. The technical specialist areas other than the geology and the resource areas and the mine planning tend to come in a bit later on once you move from conceptual mine planning and layout to specific mine design and if you want I'll talk about those sorts of capabilities, and the operational management shouldn't just be left to the end but primarily comes in later because you need to be able to take account, even in the early mine planning, of how you might be running a mine, how you might be operating a mine so that you can identify the aspects of geological information you may need to focus on to be able to operate a mine safely, some of the specialist areas you might need and in the mine planning, ways in which you may lay out the mine to make it operationally effective.

Q. So what are the areas of expertise you need for the mine planning aspect?

A. Well, if I look at the areas of expertise by what you're trying to do, rather than immediately by who they would be, you're looking to understand the best possible most economic and safest layout for the mine and for the infrastructure that goes in it which includes things like access to the seam in the first place, then the ventilation layout within the mine and the services that are required to support that, drainage because there's always water in mines and how you're going to drain the mine and dewater it, the strata control, you've basically got a series of different strata in the mine, the coal seam is different from the rock around it so to understand how to make sure the mine supports the roof and can be worked in safely without unexpected collapses obviously and the pillars which are the places you leave support of the overlying overburden and that you don't mine, which are left there obviously to do that, then your coal clearance system, how you get the coal out of the – how you're going to get the coal out of the mine, is it going to be by a pump slurry or a conveyor for example. How you're going to get the workers and the

mine equipment and materials into the mine. So what's commonly called men and materials transport and access. The services to the mine, you have an enormous number of services always going on in and out of the mine so how to provide those, both the infrastructure and the access for people who are always supporting those and providing mine services. The coal handling and the distribution through the mine and at the surface and out of the mine and then the production equipment itself. So they all lead to schedules, life of mine schedules for how all that integrates together and that leads to the life of mine cost model or economic model for the mine. So the capabilities – presume you'd like me to go on to who would you expect for that?

1412

Q. Thank you.

A. The capabilities you'll want both mining engineering specialists, people who are familiar with planning a mine for that sort of mining method and that sort of environment and civil engineering specialists as well because there are a number of civil engineering aspects to many of these. Probably mechanical and engineering specialists, ventilation engineers. You'll continue to need geologists and geotechnical engineers, coal process and engineers for the processing of the coal and getting those processes right, equipment suppliers, and then the operational, which presumably should move onto, includes again as you move to the operational phase because all that process is continuing. You don't just do it before you start the mine and then set it in stone for the life of the mine. You're continually reworking that all the time. So on an ongoing basis you're going to need those, particularly ventilation engineers because nothing is ever exactly as you designed it. You always should be revisiting that. The geologists and the geotechnical engineers should always be checking what they've found against what they expected and revising plans and details of the design, mechanical electrical engineers and all the trades that go with those processes. So all of those capabilities would be in place at pretty much any large modern mine.

1415

Q. The third item you referred to is technical specialist areas and can you just explain first what you mean by that?

A. Yes, there was probably a time in the past where underground mines were probably largely worked by hand. They were relatively shallow and you didn't try to take large volumes of coal out of the mines so you might've only taken 10 or 15% of the resource and left the other 85% in so basically you were just tunnelling in and taking the coal out. In those times probably coalmining was, there were a lot of specialist areas of knowledge required but they tend to be based on experience built up. Modern mining is much, much more difficult to get right I believe because the production processes involve everything happening very much faster. The production per person from a modern mine is very much higher than it used to be. You're using sophisticated equipment, whether it's mobile equipment and mobile plant or the infrastructure in a mine, you're likely to be mining deeper in more difficult coal in more difficult conditions and doing all of that much faster so the ability to simply say somebody with appropriate experience can provide the knowledge that you require for the detailed mine design in every aspect is, the likelihood of a person having all that expertise is very low. Instead you need expertise across a range of areas that are highly technical, probably involve data analysis and modelling of different kinds as well as experience in areas like strata control, roof support, rib support, because the techniques we use today to do those putting up props, they're putting up roof bolts that are drilled in and the analysis of those is a technical art, it is a technical specialty so strata control to stabilise the mine around the openings you're putting into it is the first area. Gas control and drainage, most but not all mines have, especially deeper mines, have some degree of gas and methane generally in them so the expertise you need is to be able to assess how much, how it will come out, at what rate, under what conditions in different methods of mining and different places in the mine so you need specialist gas ventilation and gas drainage engineers and then you need to correlate

that back or tie that back into your particular mining approach in that area so tie that back in with the mining engineer's expertise in that area. The ventilation systems themselves is separate from just the gas drainage component. Ventilation can be a relatively simple rule of thumb or increasing in large complex modern mines, especially mines that have a combination of different mining methods is actually exceptionally complex and internationally there are many people who are ventilation engineers and most mines would probably have a ventilation engineer or should have a ventilation engineer as a part of the mine staff, but on top of that you would expect to access ventilation specialists who can advise you based on broad experience and knowledge and analytical and modelling capability on specialist aspects of that help you with the design, the understanding the analysis and the modification as you go forwards and then our experience is that in the conditions that we've encountered in fact the combination that we have on the West Coast of the complex and highly variable geology and the nature of the coal seams which is quite steep in large thick coal seams combined with the mining methods that we have with hydraulic mining which, as I said this morning, involves large, potential for large slugs of gas to come out unexpectedly with variable quantities means that you need to have a very, very highly skilled set of eyes and set of, and expertise to be able to really anticipate and understand the way in which gas might come out and the way in which you might most effectively ventilate a mine and for example at present Spring Creek Mine is ventilation restricted because our original layout of the mine doesn't allow us to provide enough ventilation through all places in the mine we would like to work so as a result we work at fewer places in the mine than ideally we might like to, to be able to make sure that we have enough ventilation in each of those places to deal with the gas. Sounds simple and obvious but in fact the analysis and assessment and design of the ventilation system to optimise it, to make sure at each given place you've got six cubic metres a second of fresh air, but perhaps eight or nine cubic metres a second, that involves very specialist expertise and

even in Australasia around the world, there's actually a relatively small number of people who are able to assess good ventilation design at that level of expertise.–

1420

Q. So if I just can clarify there, does that mean that insofar as hydraulic mining is concerned you need not just a ventilation expert, but a ventilation expert who understands the additional risks and challenges that might result from hydraulic mining?

A. Yes that's correct and that doesn't necessarily mean somebody who is a unique international expertise, it may well mean your ventilation engineer at the mine has a number of years of good and varied experience in hydraulic mining in those sorts of conditions, but if you don't have that then obviously the, the next best or maybe the better step is to find somebody who is an international expert and has enough broad knowledge and expertise to be able to say, even though I'm not that familiar with that, I do understand it and combined with your local ventilation engineer and geologists working together we can assess it because obviously you don't always have access to somebody who's been around in those conditions for many years.

Q. Thank you carry on please.

A. So then we move on to another area of expertise might be monitoring systems and there's a lot of monitoring always go on in a mine, but gas monitoring would be a prime example. You need to design and locate, get your gas sensors at the locations that they are going to be useful to you as opposed to just either random locations or generic locations. You need to have equipment that's going to give you the information you need. It needs to reflect the mine layout and your objectives for the mine and your knowledge of the mine ventilation. There are a range of different gas monitoring systems. You need to be able to analyse the geological information as a part of your gas monitoring to understand what sort of gas make or gas output you're expecting in different locations in the mine. You need to understand the different gases you'll get under different conditions and you need to understand very well

when you're getting information what that information means and it's certainly my learning watching this over 11 years that you can get a lot of information, but not necessarily have a good understanding of what it means and there are specialists specially from Australia who are widely used in the industry who understand that very well and they will regularly be called in to support the ventilation engineer, the mining engineer and others. So, through the operational phase you need people qualified in all those areas working together.

Q. You referred to the need to have gas sensors at a place and the phrase was, "useful to you", can you just explain what's meant by that?

A. Yes and I'd like to make it clear at this stage, I'm not a ventilation engineer and I've never pretended to be, so I know probably just enough to be useful at my level, but I'm – I don't want to pretend that I know detailed answers here.

Q. That can be accepted.

A. So in a mine such as Spring Creek or mines in the – underground mines in the West Coast that are shall we say moderately gassy, and that can be a reasonably wide range from the low end to the high end. Understanding where gas can come from in what quantities at different times in the mining process and for in different places and where that gas is likely to go or build up and in what quantities and how it's likely to be flushed is really important. My experience and learnings are continuing in this area along with a lot of others I think, to say that probably – let's see, you need to always assume there are things you don't know and there are places that could be gas build-ups that you're not monitoring. You need to try and anticipate those and the process I talked about this morning of risk assessment is critical for that. Risk assessment is the tool for saying, not what do we know, but where is there a risk there might a gas issue. So, on the basis of that you will be wanting to monitor anything from gas concentrations in your return airways as the – I should take a step back I'm sorry if I may.

1425

A. Te process of ventilation in a mine is about having air that is extracted out of a mine that sucks air down your intake airways, flushes through the places that you want to ventilate and then sucks it back out your return airways and expels it, so from the intake airways you should have fresh air and in the return airways you will have air that contains the gas that's taken out of the mine. So, the total make of gas, the total quantity of gas from the mine can be measured at the point that all the air comes back out of the mine if you like, you go back down from there, you get to each working place and there may be three, four or five or more working places in the mine that the intake air is separated, goes round those places and all comes back together, in each one of those places you should know what total gas make you're expecting from those, first at the point that it's all collected back together at the end of each of those places, and second, around the working place where you have air that's being sucked in your main roadways into your places and then back out through a very large tube, around those places you need to think what is going on with the airflows, is there sufficient fresh airflow, that there's no point in there where you could have gas building up that's not well flushed, so you need to be monitoring a large number of locations around there. They could range from close to the face, to at the point that the air is sucked back into the return vent system, through to points in or around equipment where there might be turbulence or there might be potential for dead spots, the gas could build up, particularly because methane is much lighter than air, methane will always build up at high points so you need to be looking for dead spots at high points and it's quite common in underground mines to have an average air concentration that's measured either by a static or a handheld system in the middle of a roadway, an access way, that's at a low level but if you hold the monitor up to the roof and against the roof you find that the level can go right up because the methane rises and may be sitting at the roof. So, you need to have a system, systems, not system, that's able to identify all of those. You'll never measure everything everywhere but you need to be very aware of where you should be

looking and then also be aware of the places you are not always measuring where there might be potential for something you don't know. Sorry, that's a long answer.

Q. Thank you for that. Can I just perhaps clarify one matter, that would mean that if somebody has for example a handheld gas monitor and that gives a low reading that's not necessarily an assurance of safety because there could be gas at a higher level. Is that correct?

A. Yeah, it's a start but that's all.

Q. The fourth area that you referred to is operational management. Are you able to talk to that please?

Yes, so the operational management of the mine, that's about having all the capability in place that means that everything you've done up to the point of running the mine, operating the mine is going to either run in the way you planned or if you get any changes of significance at all from what you expected you'd have the capability to recognise that and immediately adapt to that because, as we know, underground coalmining is unforgiving but it can be managed very well provided that you follow that process of always responding to what happens. So, operational management then ranges from the general management level at a mine and you need people who are obviously experienced across the entire spectrum of what is needed from production to financial right across to safety, down through the production process at the mine a series of qualified capable people who are managing the production process, again remembering that that generally separates into the development process where you're going out, the extraction process where you're coming back and in addition then managing all the support processes around the mine, the support of the services, the infrastructure, the trades, the maintenance and all of those processes. So you need capable people across all of those areas as well. And at the same time all the other three areas I've talked about, resource assessment will have those capabilities ongoing, mine planning and design will be continually iterating and those technical specialist areas will all be operating around that.

1430

Q. Just generally, can the operation of a mine, in terms of its ability to maximise resource extraction, be considered without also considering health and safety issues?

A. No I don't believe so.

Q. At what stage in the planning design and construction process would you say health and safety considerations have to be brought to bear?

A. I don't think there's any point answer to that. I think at all stages from the moment you start contemplating mining a resource you will want to be aware of the specific properties of that resource, characteristics of that resource, to understand what the safety issues would be, alongside the production, financial, environmental issues so that everything you do from that point on can make sure that all of those are addressed. So I don't think there's any point at which you start thinking about safety. Obviously though as you approach the actual mine development and production phase the nature of those activities changes significantly.

Q. You referred to gas monitoring, and you may be aware that there's been reference to tube bundle monitoring previously. Are you able to explain what role that plays and help in keep an underground mine safe?

A. Yes, and again I'll just note here if I may that this is not my area of expertise but I'm certainly familiar with what they do. So there are a range of different ways you can monitor, for example as you said a handheld monitor which you be holding in your hand and moving around or it may be on your belt. As an example an electronic monitor that has a sensor and that will have a certain sensitivity so that's a mobile monitor. You may have a monitoring system that is similar to a handheld system but it's all wired back to a surface point in some way. So that would be an example they, a static system with – because it's instant reading, instantly back to the surface may well be real time. In other words, what you're seeing at the surface is almost instantaneously what you were seeing down at the monitoring point. What a tube bundle system does is actually take a little gas sample in the mine and it brings that little sample through tubes all the way back to the surface and then carries out an analysis of that sample when it arrives back to the

surface. So there's a delay obviously for that little parcel of gas to pass all the way through that tube from the location it was at, through that particular tube from that monitoring point into a bundle of tubes and that bundle of tubes comes all the way back to the surface and that is analysed at that surface. In general the analysis that's done on that little sample of gas back at the surface will probably be the most accurate highest quality sample and you'll be able to get the best information from that because the systems you can use at the surface are highly accurate and you can test a large number of gases. So that is a very good system to have from the point of view of information but the penalty you have with that, of course, is there is a delay which may be a number of minutes before you have that analysis compared to the real time which is the handheld belt monitoring or an alternative system which may give you almost instantaneous information but generally with equipment it won't be the range of gas information and it won't necessarily be the same quality or the same, what's the word I'm looking for, the same accuracy.

Q. Is it fair to say from much of your evidence that the gas monitoring system is only a part of the systems and procedures that are necessary to ensure that a mine is a safe and healthy place of work?

A. It's absolutely fair to say that it's a relatively small part. I won't go as far as saying it's the ambulance at the bottom of the cliff. That would be the wrong conclusion but the point about gas monitoring is it's confirming or giving you information about something that is already in existence so you can't prevent a gas build up using gas monitoring system. You may well be able to identify it and do something about it in time for it not to become a problem.

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Q. Could I turn to a different topic please which is whether or not in your view there is a role for external expert assessment of health and safety in underground mines and you have indicated earlier that you did see a role for mines inspectors. Are you able to explain what role you see for them?

A. Yes, may I step back to the first part of your question on independent inspection and then put it in that context?

Q. Certainly.

A. Yep, so in terms of inspection and the entire process around inspection is actually a process that we would call assurance, in other words assurance is about saying, providing assurance that you have information coming out that is telling you what's actually going on there and what you need to know and therefore what you need to change so within the assurance process there are a whole range of things that happened. The guy that said my hacksaw was not there and it, sure a hacksaw's not there and it should be is providing a level of insurance – sorry, level assurance, is saying I did an inspection and it wasn't there. That ranges right through to management, supervisor and increasingly mine management and then senior management, executive management and board assurance and all of those effectively are different levels of checking, reviewing assurance. Then you get to the point of saying, what other assurance can you provide around the vertical lying upwards? There are a range of assurances you can provide, one of them is what we would commonly call peer review or peer assurance where you get somebody who is in a comparable position but in another part of your operation, not connected with that part, to provide assurance that or review or inspection of what you're doing based on their comparable knowledge somewhere else. That can be internal in the company, then you can say, "we want that to be external", so you can have external assurance or review or auditing and most companies would do those all the time. Now you can say, okay is there anything else you can do other than the internal assurance, the external assurance, and there are possibly two other areas, one of them is the role of a statutory body such as a government inspectorate. That provides an additional level of assurance on top of all the others but, let there be no mistake, it would be our view, my view that that should never be regarded as the primary level of assurance. That would be a check point in time and level of assurance. The final one is a level of

assurance that might come from some other party and one example of the other parties that could be interested is employees and people in the mine. Now the process that we follow says every employee in our mine is expected to provide that assurance all the time. The guy that reported there was a hacksaw not there is essentially providing that level of assurance. You could also do that independently and say, well, and I know this is an act of discussion, employees have a specific person working for them, representing them, who goes around and does another level of assurance as well so all of those can potentially have a role. The question is, how do you put those together in a way that is the right answer, the best answer and that's where if I could just finish by saying I'm absolutely clear the absolute primary responsibility for assurance sits with the organisation. The company should never be replaced by anything else and there is no other silver bullet that will ever replace that.

Q. There are a few issues there. First, you referred to external auditors. What do you mean by external auditing in so far as health and safety is concerned?

A. Yep, external auditing and health and safety is probably exactly the same principle that people familiar with financial auditing would think of which is that an independent external person who has the knowledge and capability, but is not in any way tied up with the operation and has no vested interest in the operation or conflict due to that, comes in from the outside and based on that independent external expertise reviews the situation, the operation, reviews safety based on that person's expertise and forms their view on first, compliance very often with statutory requirements and second, safety in general and will make – provide, usually will provide a report that assesses all those, draws conclusions, makes recommendations and recommends specific actions.

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Q. Is that a process that Solid Energy uses?

A. Yes it is.

Q. How often?

A. Again in the context of the entire assurance approach that I just referred to, independent external auditing is probably something that on average we would have done at most of our operations about once a year.

Q. And one would assume, given your earlier comments about the complexity essentially of modern mines, that that external audit would need to be done by a fairly sophisticated group of auditors?

A. Yep, the reason that I was probably slightly vague with my last answer was that you could just have an external safety audit which was just a generic safety audit. You get them to come in, very broad scope and say, "Do a complete safety audit." In fact it's probably our learning that if your understanding of your risks is good then you should be – you would be better to focus on – have your external audit focusing on the higher risks rather than have them come and be all things to all people which could result in a fairly, a fairly full report which never really provides the focus on the high risks. Now that's a perfectly valid audit, but I think our experience in the last few years is that if you know that gas and ventilation, for example, are areas of specific risk in your mine and your operation, then you actually probably want a ventilation audit as opposed to a generic safety audit.

Q. Right and that's what you mean by, "An area of high risk?"

A. Yes.

Q. And how do you identify those?

A. That's the process that I described earlier where risk assessment is a part of everything from initial mine concept and geological assessment right through the planning, design process to operations, right down to I described the Take 5s, all those processes through up hazards and risks and they form your primary initial database for all the risks you will have. They will give you a very good picture and then on top of that you will do specific risk assessments using sophisticated risk assessment tools and risk specialists and subject experts to do extra risk assessment in the areas you, you expect will be higher risk, such as gas ventilation and so that will give you a very complete picture of the risks

that you're wanting to address and, and that will form the scope of the work you do and the auditing that's carried out.

Q. Now please forgive me for paraphrasing, but you referred earlier to a concept essentially akin to that of check inspector, so employee representative going in assuring some health and safety in the mine. In your view is there a role for that in underground mining?

A. Yep, I want to be probably quite clear on that. I – we don't oppose the concept of check inspector per se, but I think the point is that we believe it's actually not providing the role that there is a risk people will think it is. Any checking and any inspection and any auditing and any additional assurance is always a good thing no matter how it's done, providing it's done and logged and reported and followed up on with actions. So, you could never say ever that an additional level of checking or review of assurances isn't a good thing. The point is where you're going to get the most benefit and why. There is a risk that I've always seen with check inspectors and this could be addressed, so this is not a criticism, but it is a risk and that is the risk that a group of people say, "Well the check inspector will look after that stuff so I can be a little more relaxed about that." That becomes a culture and a behaviour issue which we talked about this morning and the example of the hacksaw, and again it's sort of repeating it and I apologise for that, but that would be a good example, could you be assured that a person would report a missing hacksaw from a toolbox, which again sounds like a fairly trivial incident, if in fact there was check inspector walking around the mine who people knew was checking for that thing would simply say, "Oh, the check inspector will pick that up next time they pass."

1445

A. So, those are the sorts of issues you go through with check inspectors so my view is that every employee in the mine should be a walking check inspector all the time, whether a face worker or a mine manager. When you get to that point, which of course is a pretty resilient organisation but we're moving there I think, then you'd say the role for a

check inspector is absolutely redundant. If you're at the other end of the maturity curve and a regressive organisation where there's no culture and behaviours that do those sorts of things anyway then any form of independent checking is going to be of much greater use to you. So, I'm sorry, that's not a black and white answer but I hope that gives it some perspective.

Q. And just finally, what about the role of check inspectors before I move on, sorry, a mines inspector before I move on to another topic?

A. A mines inspector, as is generally understood I think, is clearly quite different from a check inspector because the role of a mines inspector, and Solid Energy supports and I personally support a very strong role for the mines inspectorate, that's a part of the external process around mining that provides a range of things, all of which are useful but none of which on its own should ever replace the responsibility of a company to be absolutely and solely primarily responsible for all of those, and the mining inspectorate can have a role ranging from industry wide capability and knowledge, that doesn't necessarily exist in any specific location, to education, to assisting with training, to sharing of information, to carrying out spot inspections, to providing audits, to inspecting hazards of incidents, all of those things and it's certainly my view, based on the information I have about New Zealand and other jurisdictions, particularly Australia, particularly New South Wales and Queensland, that the role of the mine's inspectorate if scoped very well is a very, very important part of industry safety and mine safety, but that again, it's not a silver bullet, it's about saying it's a part of the total picture, it has its own role and nobody should – no organisation, company, mine should ever be allowed to believe that you can defer to the mine's inspectorate to help you address issues, to help you identify risks, to help you manage those or to tell you when you've got something you need to do. That should always be the responsibility of the mine and the company itself. The inspectorate is an overlay on that, not a replacement.

Q. In your view does the complexity of modern mines to which you referred earlier mean that there are limits on the extent to which a mine's inspector can pick up on health and safety issues?

A. Absolutely, but a mines inspector would be no different to most of the people in a given mine that as I look at a mine like Spring Creek, say we are very well aware of all the capabilities and expertise and how far that can be applied and I hope we are also aware of the areas in which we lack capability and expertise because that's a specialist skill that's required. A mines inspector is likely in general to have experience that's comparable to somebody in the statutory mine manager position. I would not expect our statutory mine manager at any of our mines to have the specialist capability that I talked about earlier, to be able to identify all issues, all things, that's why you need expert specialists to come in for those things so we need to be very careful I believe, if I may just venture a bit further, in defining that role, not to believe that that will be an all knowing, all seeing person who will understand everything, that would be a useful role that understands what they ought to see, understands what they would not be capable of seeing and knowing and is able from time to time to work with a mine, with a company, do snapshot reviews, audits, inspections and the like and identify what more needs to be done as opposed to making the assumption that that person would basically be the end of the line in knowledge.

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Q. So if we take an example, do you think that an inspector or someone carrying out a visual inspection would be able to ascertain whether the design of the ventilation system was sufficient to cope with a gas like of the type that you referred to earlier?

A. A good inspector who has a ventilation background and experience in a mine would certainly I believe, I would expect them to be able to identify generally whether the appropriate type of ventilation was in place for the mining method. I do not believe that person, any person with a visual inspection or in doing an inspection role would be able to come in, look at a mine and say, "These airflows are what was designed, these

airflows are appropriate for the gas make or for the gas that could come out sometime in the next period of time," that's a specialist area of expertise that also requires specialist monitoring equipment. For example, very few people, I am advised by experts, if any, would be able to tell the difference between six cubic metres per second of air going through a working place and eight or nine cubic metres per second of air. Some might have strong opinions on that but experience has shown that those judgments are actually not very accurate and in fact they are probably spot judgments based on a person of standing height anyway. So an inspector would be no better or worse than anybody else in those circumstances. An inspector might be able to identify that there is a sufficient or lack of monitoring to provide that information but you would need specialists and specialist equipment to be able to carry out that sort of work.

Q. And what about in relation to, for example, strata control?

A. Strata control would probably be even more complex because the number of elements that come into strata control are very many and most of the things you need to know are out of sight and in fact even if you could see into the coal seam roof you wouldn't be able to form a view anyway. They relate to engineering stress and strain, geotechnical, geological things that are going on around an opening, much less than the opening itself. Now there are obviously a range of techniques that are used to measure how much the strata are moving, how much a roof or a rib is deforming, and you would expect any senior person in a mine, or an inspector, to be able to identify those, look at those. But whether a rib bolt, or a roof bolt is working to its design capacity is not something that any inspector is going to be able to come in and automatically know. They may be able to look at the layout of the bolts and say, "That doesn't look like a great set of bolts, either they don't look like they're well installed or it looks like the roof's deforming," you would expect a range of people including an inspector to do that. But could an inspector come in and say, "That was a five tonne bolt to install, I think it's only got two tonnes capacity," no you wouldn't.

Q. If I could just turn to a different topic. As I understand it, and I think it was before your time at Solid Energy, it had an incident which unfortunately resulted in death at Mount Davy?

A. Yes, you're correct, it was before my time. Mount Davy was closed by the time I joined but I do know a little about that if you'd like me to just to carry on, over to you?

Q. If you could just very briefly describe that?

A. Yes. There were two incidents at Mount Davy, this was, I believe it was 1998/'99. To be honest there'll be people who know the dates better than I do. Mount Davy was the great new hope for the West Coast underground coalmining industry and the export coal industry. It was premium hard coking coal. The depth of the seam under Mount Davy, which is near Greymouth, was about 700 metres. So very deep coal to be mined underground, conditions that nobody in the West Coast, to my knowledge, had contemplated working in before. And as a result of that depth and the type of coal and the nature of the coal seam there was the potential for what's called "outbursts", which is where the coal is under such high stress that methane can actually burst out of the coal in significant slugs.

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A. I understand and this is only what I've learned over the years that there were two incidents at Mount Davy. In the first one there was a – a person was killed when a slab of coal came or it might've been stone I'm not sure, came off the rib, the side of the, the shaft when the drift was being driven down to the, to the coal seam and that was what you'd call a strata control incident. The second incident was also during stone drivage, in other words the driving down through the rock to the coal seam, and what I understand happened was that there was a very small, very thin seam of coal within the rock that wasn't expected. This was well down very close to the coal seam I believe, and there was an outburst of that seam where with a sudden crushing coal dust came out and gas came out at the same time and two men were asphyxiated as a result of that.

Q. What did Solid Energy learn from that?

A. Well we closed Mount Davy, that wasn't solely because of the safety issues, but if you put it all together we formed the view at the time, and I do have to note that coal prices were at an all time low at the time, because it was the bottom of the Asian crisis, but the view I understand was formed at the time by management and the board that we could not mine both economically and safely. So the mine was closed the, the sunk costs of I think about 40, 45, $46 million were written off and the mine has remained closed since. But, it was a very salutary lesson to the, to Solid Energy and to the industry and that was the event I think that led to our initial development of the project planning system, our project assessment guideline system that are described in my evidence, where we said, we didn't have enough information, enough knowledge for a range of reasons we were trying to, I understand, get into the mine too early without enough information for a range of reasons related to international markets and we said we need to develop a very comprehensive stage gate system that requires us to step through a whole range of process steps, sign them off at each point before we ever get to that situation again.

Q. What did it learn specifically in relation to health and safety?

A. I probably would struggle to answer that question more specifically because I wasn't around at the time. I, I think it changed the awareness of everybody in the company to recognise that being around for 100 years in coalmining didn't mean you necessarily knew everything that was going on when – specifically when there were significant number of changes in the mining environment and I talked this morning about the changes being really important and that's a good example. This was a different type of coal or quality of coal, much, much deeper than we'd ever been before with different risks and all of that needed a completely different approach and we realised how significant it is to manage risks when conditions, mining conditions are changing.

Q. How does the industry learn from events such as Mount Davy which are specific to a particular mine and a particular company?

A. You've asked me of that incident such as Mount Davy obviously, not just specific to Mount Davy. I don't know the answer to Mount Davy itself, and there hasn't – well obviously up until recently been any comparable sort of incident with that sort of different set of circumstances I think, that were that different that the industry wide learning's needed perhaps, but in general there are ways in which industry does learn. There is usually reasonably good communication within industry of new hazards. There is an international system of hazard alerts which we all work with, but Mount Davy's type of situation is actually much bigger than just a hazard alert. It relates to an entire range of processes and I, I think probably what - it's the wakeup call to industry that causes every mining company to rethink what they do is perhaps my best answer to that. Sorry, it's…

1500

Q. Does the industry for example have a formal system for ensuring that when an incident such as Mount Davy happens there is a report to the industry about what happened, why it happened and what would need to be done to help prevent that in future?

A. I may be wrong but my belief is that the answer to that is probably no.

Q. Do you know whether the industry has ever considered that?

A. I think it's something that's probably been informally discussed. There are industry training organisations and industry quality and safety organisations that exist and were set up partly I think in response to the changes away from the old mine inspectorate and one of those is an organisation called Minex which does have a role to bring people together to talk about and identify industry specific issues, training requirements and opportunities, sharing of practices. I have to apologise and say I'm not very close to Minex so I don't know a whole lot about exactly how it works although I know a number of our people are actively involved and Solid Energy's an active supporter of that. Beyond that I can't tell you very much sorry.

Q. In your view is there a role for approved codes of practice?

A. They're, if I don't necessarily use the word codes of practice but call them perhaps if I could standard operating procedures which would

probably be my preferred definition and answer it that way. Yes, there potentially is. Safety and management of risks and management of processes requires a whole range of steps starting from the general policies, working down from policies to general procedures and then to specific procedures and standard operating practices which increasingly move from principle based and generic requirements down to specifications of what you must do and you may not deviate from. The point about standard operating procedures is that it says there are a number of things that you do when you're operating something that never change no matter where you're doing them or how you're doing them, they shouldn't change so if they're standard across a mine they tend to become, they should become a standard operating procedure in a mine. If they're standard across several underground mines in the company we are likely to implement them as company wide rather than mine specific standard operating procedures. If they are of a nature that they are relatively independent of the location and are common to a range of mines irrespective of the operator then the opportunity there is to have them as industry wide standard operating procedures. Codes of practice is probably something slightly different and there are jurisdictions for example and Queensland is one where there is a very large number of, I forget what they're called in Queensland, but effectively standard operating procedure, standard operating practices, I think it's hundreds where the industry working with the regulatory bodies and has established and said, "This is the standard way to do these things," and undoubtedly everybody benefits from that because you haven't got people reinventing the wheel so everybody's able to move forwards faster. The risk would become whether you try to standardise everything or alternatively where people view that so long as you're complying with the standard operating procedure you're okay and it's never a replacement for good judgment but, yes, I think in short my answer is there is certainly a place for that concept.

Q. For the concept of codes of practice?

A. Well if I could call it standard procedures that may well be industry wide whether they're statutory, mandatory, voluntary, I haven't really thought through that but industry wide sharing of standard information which may well become mandatory or statutory there's certainly a very, very valid role to contemplate that.

1505

Q. So just to ensure that we're talking about the same sort of thing, are you familiar for example with some of the Minex codes of practice?

A. Unfortunately not in detail but there will be things like maintaining equipment or standard equipment procedures or equipment requirements or standard practices for specific processes that, yes, I'm aware Minex has some of those. Sorry, all I was meaning is the word, "code," I think is a word I'm not quite sure exactly what the definition of that is, it's the word code rather than the standard practice that I'm trying to say I'm not too sure on here.

Q. Right well if we take the example of the Minex code of practice and accepting that you don't, as I understand it, know the detail of those, do you know sufficient to offer an opinion as to whether you think in your view there's a useful place for those, regardless of by whom they are promulgated?

A. To the extent that I know of them I would say they are definitely very useful because they represent a full body of industry information compiled in one place that others can use. I actually can't tell you whether they're mandatory or voluntary in terms of the compliance with those.

RE-EXAMINATION: MR STEVENS

Q. Dr Elder, can I start please with the commerce committee reports that were put to you yesterday, do you still have those available?

A. Yes I do, yes.

Q. And yesterday in your replies to Ms Shortall you noted the difference under the health and safety sections between the 2008/2009 report (exhibit 1, 11.07.11) and the following years as to who had raised or

described Solid Energy's health and safety performances unacceptable?

A. Yes, I believe I noted with a bit of surprise that maybe the 2000, the later report had got that wrong.

Q. Then based on that can you confirm who it was that described Solid Energy's health and safety performances unacceptable in the 2008/2009 report?

A. Yes, it was Solid Energy in our own information provided to the select committee and I believe in our annual report and if I could just add to that why that was done?

Q. Yes.

A. That was based on, in particular, our review of safety at our Stockton open cast mine where we had reviewed a number of hazard and incident reports over a period of time and concluded that in fact we had too many high to very high risk incidents, too many repeat incidents and too many repeat incidents where there was zero barriers left or a last barrier was removed and as a result of that during the course of that year that we'd reported on we had actually closed the mine for several days and taken a whole set of steps to address what we considered were a range of issues, particularly behaviour-based from the top to the bottom of the mine and throughout the company, and as a result of those measures over a period of about three to six months we had something like a 10 to 20 fold improvement in the number of unacceptable incidents we were getting.

Q. Can you just briefly outline what some of those steps were that you took at Stockton following your temporary closure of that mine?

A. Yes, perhaps in many ways the most important measure, although it was an obvious one, was to make the decision that we would move very quickly to a zero tolerance position on safety and non-compliance. That sounds obvious and easy perhaps but that was a mine that had been operating for well over 50 years and simply saying we had zero tolerance and then putting that into practice isn't straight forward because it's unacceptable to say to people in the company we now have

zero tolerance for non-compliance if they're not given the tools, the equipment, the training, the management support, the organisational support and all these things going with that, that go with that, to allow them to do that. So we immediately embarked on a process that said, "We are targeting zero tolerance but we need to make all these changes at a company level and we expect everyone to come with us on that." I specifically remember the day we – if I may just carry on?

1510

Q. Yes please.

A. I specifically remember I was over there in a meeting about our safety performance when the decision was made in the meeting I was in by the mine manager to close the mine. And what he said was, "Tomorrow morning everybody will come to the hall in Westport, we will address the entire workforce." Well we did it in two shifts. And I specifically remember after the mine manager walked through where we were why the mine was closed and why it wouldn't reopen without a change and we'd continue to close it. I was asked to, and I stepped forward, and the statement I made at that time, which I think was pretty important, was that we were all in this together. And I invited anybody who shared our view that we need to make this change to come back to work with us the next day but anybody who was reluctant to share that view I said we're willing to accept their resignation on the spot. And that wasn't targeting employees, that was targeting everybody right up to senior management level.

Q. Are you able say if that statement was made to all of the Stockton employees?

A. It was.

Q. And do you recall now how many days you or your executives met with the staff from Stockton at that hall?

A. We were over there because of our concern about the safety situation. We met for about half a day with the mine management, including the contractors, management at the mine, and collectively worked through the issues and identified that business as usual to try and go and

address these wasn't an option for us. So we agreed that we would, notwithstanding it being New Zealand's largest mine and our single biggest financial revenue source in the company, we agreed, and we had board endorsement of this or stronger, that if we didn't get the changes we were looking for that we were willing to close the mine and leave it closed until we were comfortable that we could reopen it.

Q. What if any changes were made to the operator of the mine?

A. This was a period that was a few months out from a point at which we were expecting to change the operations at the mine. So we had a contractor in place who had been there for about five years and a number of other subcontractors in a smaller scale on the site. I think it would be inappropriate for me to say that we changed the contractor for safety reasons but it would certainly be appropriate to say that in appointing the new contractor or establishing the new operating regime on this, at the Stockton Mine, that safety was one of the highest, if not the highest, single factor in us determining the best operating model going forwards.

Q. Just lastly on that topic. If you go to the second of the Commerce Committee reports (exhibit 2, 11.07.11), and if you can have a look please at the health and safety comments there. If I can just read from that about the lost time injury frequency decreased from 16.2 to 5.2 per million hours work. The lost time injury severity rate dropped by more than half. And the all injury frequency incidents requiring medical treatment decreased from 50.4 to 23.2 million hours work and Solid Energy credits the change to its whole of company approach to health and safety covering five areas, and they are listed. To what extent does that more positive report reflect what occurred at Stockton the following year, sorry, the previous year?

A. A significant part of that reflects Stockton. At Stockton at the time we had something between 500 and 700 people working out of a total Solid Energy workforce of under 1000, plus contractors. So our industry statistics were strongly weighted by Stockton. So that quite significantly reflects Stockton.

1515

Q. Just finally on those two reports, you knew that that, I take it, that that was – these were to be public documents when you were addresses the Committee?

A. Which report sorry?

Q. The reports of the Commerce Committee, you knew that the outcomes –

A. Yes.

Q. – and the findings would be public?

A. Yes the Commerce Select Committee process each year is a public process. So, what we say there is on the public record.

Q. The only other matter from yesterday, you were asked about three prosecutions by Department of Labour, you initially only recalled two, can you just approximately recall how long ago those prosecutions were or do you not know?

A. Approximately, I'm sorry I don't know specifically and the reason I didn't recall the third was that it was one that happened at Stockton very shortly after I arrived, so I had forgotten that one. The second one I think, if I recall correctly, maybe early 2001 which was the year after I arrived, but I might be out by a year and the third one again would've been sometime around five, six, seven years ago. Again, sorry I don't recall the exact year. Would I be permitted to add just a note on those?

Q. You would be permitted to by me to add a note on those Dr Elder.

A. I gave the answer yesterday that we had pleaded guilty to those three prosecutions where I think is correct, I didn't say why that was and I think it's probably reasonably important to understand that it's my fundamental belief and our philosophy in Solid Energy in several things. First we have a no blame culture and effectively it's a very difficult area in defending specific prosecutions if you have a no blame policy and culture because you end up getting quite personal. And our belief was that if our – if we had – we'd been prosecuted for what were significant accidents then our organisation had failed as a result. The specific prosecution was under the Occupational Safety and Health Act which was the requirement to take all practicable steps. It's my view and it

was our view then that simply by virtue of the fact the accident had occurred and our belief that you should always be able to take all practicable steps, then by definition we could not have so rather than contest it we chose to stay consistent with our policy and plead guilty and take the view that learning from that was much more important than defending it.

Q. Can I turn please to - a couple of reports were put to you by Ms Shortall today. One is the, was I think the technical review annexed to the New Zealand IPO for Pike River, do you have that? that's the BDA report and I think it's number NZOG0056.

A. Sorry I don't have those, but I, I'm familiar with the – a number of the details of them. I think they were presented on the screen.

MR STEVENS ADDRESSES THE COURT

RE-EXAMINATION CONTINUES: MR STEVENS

Q. You said in answer to some cross-examination about whether inseam drilling could fulfil some of the gaps in terms of Pike River and I recorded you as saying that BDA has some other fundamental flaws in its report which I'm happy to address. And I'd ask you, if you could please, address what you meant in that statement?

A. Yes, if I could offer the background to those because those are pretty strong statements I appreciate, and these are organisations that either by reputation, as I have learned or from my past experience I very much respect, but I'm also aware that any report comes down to what an individual does on the day based on the information they have. The point of the reports of course is to provide information and there are some key points in the report which represent a fundamental failure to obtain key information that would change the conclusions in them and if I could refer you to page 133.

1520

Q. So you do have the BDA one?

A. I just have some notes that I've taken on this, I don't have the report but I'm just going to try and find the right location, I made a note this is page

133, if you could enlarge for us, it's the section under Pike River proposed mining methods and layout, paragraph 2, if I could read that for you and I think you'll see, if I may, where I'm going on this. "A critical concern, and I'll just summarise this, but it's a very key point if I may that needs to be highlighted, relates to the increased scale of production compared to current operations and worldwide experience." If I jump down from there to about just under halfway down and read the sentence, "Pike River is planning to use three production units but only one at any particular time to achieve up to 1.3 million tonnes per annum." Now, the next part of that sentence is crucially important, "Effectively three times the most recent production of Strongman Number 2 prior to closure and around 50% higher than recent Spring Creek levels." That's a statement of fact, at least it should be, that's based on directly relevant comparable industry information. That statement says that 1.3 million tonnes per annum is three times the recent structure production of Strongman 2 which must therefore have been about 430,000 tonnes per annum and 50% higher than recent Spring Creek levels implying that their recent production must have been just over 800,000 tonnes per annum. Now, I have the production numbers for Strongman and Spring Creek. Strongman, the annual production in the years before its closure was about 260,000 tonnes, 1.3 million tonnes per annum is five times that number not three times that number, but perhaps even more relevant Spring Creek, the statement there says 50% higher than recent Spring Creek levels, the recent Spring Creek levels over the three or four years before that averaged about 230,000 tonnes per annum, the highest Spring Creek ever got to in 2006 was 430,000 tonnes per annum. 1.3 million tonnes per annum is not 50% higher, it's in fact – what is it – it's about three to four times higher than Spring Creek, in fact three to eight times higher than Spring Creek had ever achieved. So, the key point that I made this morning is there was factual information available in the industry, widely known on what Spring Creek production was. In this report the writer's of the report made a factual error in obtaining that information, drawing

a conclusion about the ability to carry out hydraulic mining which presumably was therefore carried forwards through the company, through either management or board understanding and through the IPO to give a, in my view, an incorrect view of how easy it would be to obtain production targets at Pike River. I can't draw the obvious inference from that but that may have coloured the view on what sort of geological information would need to be available but I do note in a number of places in the report that there are significant caveats expressed in that report about geological information.

1525

Q. Well can I just - can we go through those perhaps for those you've got? Can I take you please to the paragraph immediately above the heading which is on the screen?

A. Yes.

Q. The final paragraph before you, Dr Elder, is that one of the caveats?

MR MOUNT ADDRESSES THE COURT – PAGE 138 OF ELECTRONIC DOCUMENT

THE COURT:

So Mr Stevens you're presently quoting from DA0112.02790 at 138?

MR STEVENS:

I am, sir, and I was taking the witness on that page to the paragraph immediately before the heading, "Pike River proposed mining methods and layout."

RE-EXAMINATION CONTINUES: MR STEVENS

A. As I'm reading that I'm not sure that's the primary paragraph that I would be drawing my conclusions from. I think the first paragraph showing there on the warning on the geological structure disrupting development and limiting available production reserves is perhaps the more appropriate expression of concern.

Q. It's an expression of concern in terms of the caveat by the authors?

A. A caveat by the authors and identification of potential for significant risk, yes.

Q. And to what extent is that risk heightened by the extent of the surface drilling which was undertaken?

A. Well surface drilling and any drilling, including inseam drilling which I should be clear is a valuable technique is a way of providing additional information to provide, to hopefully mean that there will be less uncertainty, fewer surprises and less disruption of the production process and development. The difference between surface drilling and inseam drilling of course is that surface drilling can be done in advance of mine development. Inseam drilling, by its nature, is done during mine development.

Q. You'd said there were other passages that you wish to refer to and we'll need to go a little more slowly just to get the correct reference for the record?

A. Yes, if I could refer to what I've recorded as page 133, I'm sorry I don't know how to –

THE COURT ADDRESSES WITNESS – PAGE 133

RE-EXAMINATION CONTINUES: MR STEVENS

A. Okay, and in fact it's the paragraph right above the highlighted one there beginning, "From a mining perspective. From a mining system perspective." If I could just read what that says, "From a mining system perspective the success of the hydraulic mining method is fundamentally dependent on the capacity and reliability of the water pumping and reticulation piping network through the mine to operate the hydraulic monitors." While that is correct, that combined with another point that I noted -

1530

1530 GB

A. While that is correct that combined with another point that I noted on the, and I apologise I just need a moment to see where it was, on

page135... it's a section called, "Summary of Mining Risk Factors," could you highlight the first paragraph there please?

Q. Yes. And that's 140 of that document? The paragraph on the basis of the foregoing discussions?

A. That's the one. So that identifies, as was discussed this morning, that paragraph highlights what BDA considered the three highest risk factors in relation to underground mining and they said it's the impact of material unknown or unexpected geological structures which I would obviously agree with. The occurrence of excessive or unpredicted surface subsidence was spontaneous and spontaneous combustion, that to me possibly is implying what would be the highest risk to the project but is not stating it explicitly, which is the development rates that could be achieved. Now the development rates, as I explained yesterday, development is the process of getting through as fast as possible to put the infrastructure in place before you come back. In a hydraulic mine the hydraulic mining process actually takes a lot of coal out relatively quickly. Our experience and widespread experience is it's not really a constraining factor. A lot of the time your hydraulic monitor is sitting round waiting for development to catch up so there's somewhere to extract from. So from the point of view of project risk this review hasn't identified for the hydraulic mining process what our experience says is the major risk, which is that you can't develop fast enough to stay in extraction and achieve those high rates. And again, I go back to the numbers I discussed earlier that the projection for this mine was 1.3 million tonnes per year or over its life, averaging I think around a million tonnes per year. We have never achieved over about 430,000 tonnes at Spring Creek. The reason for that is in the West Coast mining conditions it's really difficult to keep your development ahead of your extraction so your hydraulic monitor sits round doing nothing a lot of the time. If I look at the place then where they address the development rates, and my notes suggest that this is on page 133 again.

THE COURT ADDRESSES MR STEVENS – TIMING

COURT ADJOURNS: 3.33 PM

COURT RESUMES: 3.50 PM

RE-EXAMINATION CONTINUES: MR STEVENS

Q. Dr Elder we were continuing with the same document on the summation page reference 138 of the document, page 133, would you continue please?

A. Yes so I'm addressing the question of whether this document represents things as consistently with mine and Solid Energy people's view of the resource. So, just picking up a further point regarding what we regard as a major inconsistency incompatible with industry information. There is a comment here in the bottom paragraph, if we could highlight that, "That the currently proposed mine plan and layout takes into account the latest geological interpretations. It appears to be a well designed conservative approach for the adoption of this mining system with achievable extraction ratios…" and goes on from there. If I could go to the first paragraph at the top of the next page, which I think deals with the development rates with respect to well designed conservative approach. "Mining development rates are considered reasonably conservative with a scheduled rate of advance for the continuous miner and road header units of approximately 22 metres today or more importantly 7.2 metres per shift." I have to say I don't know what development rates were achieved at Pike River. So, I simply make the comment that I don't believe Solid Energy at any mine anywhere in New Zealand has ever achieved a rate even approaching 7.2 metres per shift on a regular basis. I'm not even sure we've ever even approached that rate or achieved that rate on a one-shift basis. If we have it would've been very isolated. So, industry information in practice in New Zealand would suggest that it is anything but conservative notwithstanding the widely different geological mining conditions that may apply in different mines, which I accept, but this report has said it's a conservative approach to the mining system, I don't think anybody in Solid Energy would consider 7.2 metres a shift underground in West Coast conditions is anything other than hugely aspirational. So, I

don't really want to make further points about that. All I, I'm really doing in answering the question is addressing the point that these are incredible reports. I have great respect for the people who prepared them, for the companies who prepared them, but the point I make in my evidence yesterday still absolutely stands. That the credibility of report is not just about the people or the company, it's about the experience that's relative to the conditions and I found – I find two places at least in this report where there are comments, statements made that appear to me to be widely at variance with experience and the conditions on the West Coast.

Q. Can I just take you to one more paragraph in that report please and it's at the report's number 131, which I suspect for summation is probably 136 and it is the fourth paragraph under the heading, "Pike River Resources and Reserves." If you could highlight that fourth paragraph please. It's the one that's up on the screen starting, "The geology of Pike River deposit is broadly understood although there is limited data upon which to place quality estimates and structural and geotechnical analysis. In particular structural interpretation of seam structures and geometry has significant impacts on my development of panel layouts." In light of that is there anything that – what – is there anything additional that you would say about the optimism of the 7.2 metres per shift estimate?

A. That would simply be very consistent with my comment that if you broadly understand geology and a deposit but have limited data upon which to base those analyses and estimates then the 7.2 metres of shift represents a transposition, probably of expected development rates, that would be considered certainly conservative I think in Australian conditions to New Zealand conditions and that would be an enormous caveat that tied with our knowledge of New Zealand conditions. You put those together and say very, very optimistic.

1555

Q. Thank you Dr Elder, I'll now move to the second item that was put to you today and it's summation DAO012.03212. It is the RDCL report

which was appendix 1 to the simplified disclosure prospectus that was seeking an additional capital of 40 million in 2010. Now, I've got that on the screen, I'd just like to take you please to four aspects of that report. The first is on the next page which will be G034, I'm sorry, two pages on, G035, and the second paragraph of that page, are you familiar with the scope of the review in 2010 when you were answering questions this morning?

A. I recall the discussion I think, yes.

Q. So simply to the record that it's just any material changes in the additional geological data and that was the purpose of it, can we then please go to the conclusions in that document and that's at page 43 of that appendix and I'd ask that you, please Doctor Elder just to balance what was put to you this morning, if you could read those conclusions in the report?

A. You'd like me to read them in?

Q. Yes please.

A. "We consider that the new data assessed in this review is consistent with the existing model with regard to the global resource volume and coal quality characteristics. There are geological features that have been encountered within the mine that are not contained within the model. These pose operational challenges to the mine, rather than a material change in the resource. In reviewing the results of the new surface drill holes it is apparent that the exact spatial location of the coal seam as reflected in the model still has a degree of uncertainty. The potential remains for an alternative structural interpretation for a limited number of historical drilling intersections. The identified issues with the model relate to drilling density, localised displacement of the coal seam and the resolution at which the model was developed. The coal quality data that has been acquired since the existing model was prepared does not indicate any issues of material significance."

Q. Can I take you please next to the recommendations which are on the following page G046 and to the last two paragraphs and if you could please read those and then I'll just put one question to you?

A. "High resolution geological models of production areas are required at least 12 months prior to mining. This is required to ensure that adequate time is available to adapt the mine development to suit the actual floor and roof positions. Indications are that the geological complexity of the Pike River coalfield will continue to place pressure on the proposed development schedule for some time. Geological interpretations need to be reviewed and refined on an ongoing basis using new data as it comes to hand. The challenge that the faulting presents is in the ability to adequately interpret and manage the integration of reinterpreted models into the planning process. There is an urgency required in this process as hydro-monitor mining approaches."

1600

Q. Now how do those recommendations there compare with your experience as to what is required particularly with reference to Spring Creek?

A. Well I'm reading these obviously for the first time and that statement looks to me like a statement that could've been perhaps made any time during the 10 years leading up to that based on our experience at Spring Creek. It's very consistent with our conclusions and observations at Solid Energy throughout.

Q. And, lastly, it was put to you – sorry, if we can just go to the next page please and under, "Limitations of consent," could the middle paragraph please be highlighted there. It was put to you that the authors would incur personal liability for penning those reports.

OBJECTION: MS SHORTALL (16:01:21)

CROSS-EXAMINATION CONTINUES: MR STEVENS

Q. Okay, it was put to you that they could incur personal liability. When you agreed to that were you aware that there was an express limitation on behalf of Pike River Coal Limited to indemnify the author?

A. No, I was not.

Q. Just a final topic please. Ms Tregonning put to you some matters in respect of the sale of the 20,000 tonnes of coal and put to you that were you aware that there were contracts for 70% of Pike's production by shareholders. I'll just ask you two questions please, Dr Elder, in respect of that sale by Solid Energy. Firstly please what involvement did Pike have in terms of those sale attempts of that coal by Solid Energy?

A. A person named Bob Reynolds who I understand to either be a market manager or a contracting marketer, market manager for Pike River worked closely with us throughout the process and indeed attempted a number of times to identify sale opportunities working with us and reported back that that was unsuccessful.

Q. And just in terms of broad categories, are you aware of the types of potential buyers that that 20,000 tonnes was put to?

A. Yes, I am.

Q. And who were they please?

A. There were I believe there was an initial targeted customer which was Nisshin Steel in Japan who was an existing Pike River customer who either rejected the cargo or Bob Reynolds advised we shouldn't approach for a reason I don't recall. We approached Chinese customers again working jointly with Bob Reynolds or he may have made the approach and the answer was they weren't interested in the coal because of the high volatile matter. Then we approached Indian customers who generally will take coal of a wider range or specifications because of the need to mix, blend it with their own coal which generally has very high ash and that's turned out to be very problematic and we were unsuccessful there including with Gujarat and if I remember rightly Saurashtra the shareholders who rejected it and finally –

Q. Sorry just to pause there. The shareholders of whom?

A. Of Pike River.

Q. Both of them?

A. To my understanding had offtake contracts for the coal and finally the coal, and this was I believe close to four to six months later after all other sources had failed I recall the coal was blended with some

Solid Energy coal and sold to I think it was Nippon Steel as a semi-soft which was the only opportunity we had to move the coal and that was, there were a couple of packages, one was sold at slightly greater than the initial amount that Solid Energy had agreed as a floor price and the other part of the coal was actually sold at less than that price.

1605

Q. And who got the benefit of the slightly greater amount in terms of what you called the floor price?

A. The agreement that we had with Pike River was that we would pay 150 US dollars a tonne to Pike River for the coal and any amount we achieved about that we would transparently pass on to Pike River. The amount that was sold less than that price I believe, although I'm not certain, that that was a Solid Energy cost. But I may be wrong on that.

Q. So in summary, Pike would get any upside but Solid Energy would wear any downside in the price?

A. Effectively that was the agreement, yes.

QUESTIONS FROM COMMISIONER BELL:

Q. Dr Elder, I'm interested on the basis that Pike River and Spring Creek because of their proximity and similar mining operations there could be some things we could learn from looking at Spring Creek to a slightly more detailed extent. Can I ask you to provide the Commission with information relating to the lost time injury frequency rate for Spring Creek. I'm aware we've seen a reduction on the financial review document but were the actual figures for Spring Creek and how do they compare with other mines in your portfolio?

A. I have to apologise, I don't have the numbers at my fingertips on that. What I can tell you is that we benchmark our underground mines generally against New South Wales underground mines in benchmarks and that at Spring Creek the lost time injury frequency rate has indeed come down. I believe it's comparable at present to the average for New South Wales but it is still at a level that I would consider too high.

Q. Why did you close the Spring Creek Mine for a period of months after November 2010?

A. Yeah. We closed the Spring Creek Mine twice during the period following the Pike River event. The first time was about a week later, it may have been earlier than that, and that was simply because we had devoted a very large part of our resources at Spring Creek to the mine, to the Pike River recovery and rescue operation, including through Mines Rescue and we made the decision that first everybody was very very tired and second we couldn't be confident that we had sufficient personnel so we felt it was safer to close the mine for a period of time, or effectively put it on camera maintenance, central activities, rather than continue on and give everybody a good break. So that was for a few days to a week, I'm sorry I don't recall the exact duration. The second time was approximately the 1st of December I think plus or minus a few days and that was along sustained closure that's I think been very public. That was the result of us receiving an internal audit and review report and a wide range of discussions internally that led us to the conclusion that the path we were taking at Spring Creek to bring out long-term safety improvements at Spring Creek was moving too slowly, partly because of the transfer of resources across to the Pike River support. I want to emphasise very clearly that was unconnected in any way with what had happened to Pike River, although I'm sure it was on all of our minds, the work that we had commissioned internally and externally to support that, which included external ventilation reviews had been recommended and commenced way back in May of last year and it had taken some time for that work to be carried out, to be completed. When we received that report, and it was pretty much the day we received that report, we reviewed all the recommendations, all the recommended actions, and made the decision that rather than implement those in parallel with mine operation we should treat those as a top priority and spend, focus all our effort at Spring Creek Mine on those. We could've carried on operating the mine but it was our judgment that it was the right decision to focus solely on

the safety improvement plan rather than have that carried out in conjunction with continued mine operations. At the time we thought that might result in the mine being closed for three to four weeks. As we progressed forwards we continually reviewed that and carried out continuous risk assessments and each time we did we concluded that the better answer rather than re-opening the mine to production and continuing the rest of the programme was to carry on the safety improvements because we saw the benefits in improvements we were getting and we felt that they would potentially be slower and more compromised in delivering those improvements if we put the mine back into production. So in the end we decided to keep the mine closed and I don't think we re-opened it in development until around February and then didn't re-start extraction until a month or two later than that.

1610

Q. Also we know this morning about two cable flashes, one fire, a friction ignition over a period of about eight weeks up until fairly recently, does that give you great cause for concern?

A. It gives me massive cause for concern yes. As I said this morning those clearly are incidents. There were no significant consequences from those which simply says that all our controls in the mine to prevent the consequences worked as planned, but the bow tie concept that I discussed earlier quite obviously says you don't want to get to the knot on the bow tie; you don't want to get to incidents. And that particular sequence of incidents has caused great alarm right up through and including board level and we are carrying out investigations at the moment to identify why and how those could happen.

Q. Because I mean based on some of what you said before, in terms of learning from events, it is a concern that you had a second cable flash event only four weeks or thereabouts after the first one?

A. Yes and I did say this morning and I apologised that I wasn't – I didn't have the incident information with me on the first one, so and I haven't seen the investigation reports so I'm not actually certain that they are the same repeat incident, but they were both cable flashes so I accept

that the information that I think counsel put before me, but I would have to go away and check that. I'm not sure that that's – that's certain at this stage.

Q. Just finally Dr Elder, are you aware of any other hydro-mining operations anywhere else in the world or are they just located here in New Zealand?

A. The first operation that I'm aware of was by Mitsui Mining in Japan which was probably a couple of decades ago and stopped after that. there was a mining, hydraulic mining operation in Canada, I don't know if that's continued and I note in the report that was provided to me yesterday a suggestion that there was a hydraulic mining operation I think somewhere in Europe at one stage. I'm actually not aware of any – other than possibly the Canadian one, anywhere else in the world that it's being done at present, but that doesn't mean to say it's not.

THE COURT:

Q. I have no questions as such Dr Elder, but in the event that the Commission wanted access to the injury frequency data that was the subject matter of Commissioner Bell's questions, that could be made available I take it on request?

A. We'd be very happy to provide that, yes.

MR HAMPTON ADDRESSES THE COURT – ONE WEEK CLOSURE FROM 9 NOVEMBER 2010 AS A RESULT OF A SPONTANEOUS COMBUSTION HEAT INCIDENT

WITNESS:

No, if I may answer that I appreciate that to be absolutely clear; we have closed a number of mines for different periods of time on a number of occasions. This is a part of our approach to safety so while closing a mine because you're concerned that you'll need to do something about safety is, is always an indicator of concern, it's not, in my mind one of those things that we record as a red letter event in my mind that I remember that specifically. So, I recall last year we actually stood down operations at Spring Creek on a

number of occasions for different reasons, all of which were positive safety acts. We – I do believe you're correct had a closure to investigate or follow up on a heating incident, I don't recall how long it was prior to the Pike River explosion, so clearly not connected with that and then there was the two stand downs afterwards that I referred to.

1615

MR HAMPTON ADDRESSES THE COURT:

I wonder sir if it's appropriate to enquire whether you might want to get the record of those stand down enclosures from in that year we've just spoken of sir but I just wanted the record to be correct about it because that was contrary to my information sir. Thank you.

FURTHER QUESTIONS FROM COMMISSIONER BELL

Q. Was the mines inspectorate involved in any of the close down operations or were they involved while the mine was closed and you were doing the various improvements to it?

A. Again, if I at risk of not remembering all the events, I don't believe or recall any circumstance under which the mines been closed as a result of intervention from the mine inspectorate. They have all been voluntary as a part of us following our procedures to investigate incidents and follow up.

Q. But during the actual closure were they available to assist? Did they come to the mine while it was closed?

A. I'll have to assume the answer was almost certainly yes although I can't recall the specifics I'm sorry, but we'd be happy to follow up on that for you.

WITNESS EXCUSED

MS SHORTALL ADDRESSES THE COURT – WITHDRAWAL OF APPLICATION

MS BEATON CALLS:

JANE NEWMAN (AFFIRMED)

Q. Can you confirm that your full name is Jane Newman?

A. That's correct.

Q. You live in Christchurch?

A. I do.

Q. And can you tell us your current position please?

A. I run a consultancy called Newman Energy Research.

Q. And I think you're the director and a senior scientist with that organisation?

A. That's correct.

Q. What are your academic qualifications?

A. I graduated first class honours and PhD from Canterbury University in Christchurch.

Q. And what was your degree in relation to?

A. It was the geology of the major West Coast coalfields.

Q. Can you confirm to us please what memberships you hold of relevant societies to your profession?

A. The Australasian Institute of Mining and Metallurgy, The Society for Organic Petrology, The International Committee for Coal and Organic Petrology and New Zealand Geological Society and sundry local groups.

1620

Q. Now I just want to deal briefly, Dr Newman, with how it is that you came to make your submission to the Royal Commission. That was a voluntarily provided submission that you prepared yourself I think with the assistance at some points from the commission's investigator, Mr Stokes?

A. Yes, I knew that probably more than anybody else I had had the longest and most frequent involvement in the Pike River coalfield geology and as a geologist I personally think that that's one of the most important factors in safe mining. I thought it would be useful to provide my

historical perspective but also my interpretation of the major geological complications as I see them which are generally not well understood.

Q. Just on the issue of your knowledge of and involvement with the Pike River area, that extends back by my account about 31 years. Would that be right?

A. That's correct.

Q. You –

A. 1979.

Q. Right. Perhaps we'll just, I know you in your statement your submission that you filed, which for the record is NEW001, that you have there gone through what you've referred to as timeline –

A. Mhm.

Q. – of the history really of investigation at Pike River coalfield. You've done that in some detail?

A. Yes.

Q. I just wondered though it might be of assistance to those present if we just quickly summarise perhaps what it is that your personal involvement was over that period of 31 years until present?

A. Okay, yes, we can do that. Initially when the coalfield was first commercially assessed that was starting in 1980 was the first serious investigation. I happened to be beginning my PhD studies at that time and had already made inquiries for access to documentation and this came to the attention of the licence holder at the time who was Terry Bates through Otter Minerals. He contacted us to say could we jointly make some investigations in the field which we did in 1980 and we continued to have a close and very productive relationship right up until 1988. There was a quiet period while the area was being assessed for the Paparoa National Park boundary definition. At about 1988 the licence passed to New Zealand Oil and Gas and –

Q. I'll just pause you there before you go on.

A. Yep.

Q. Sorry to interrupt you but when you say "we" in terms of the work that was happening, who were you referring to?

A. There were several of us doing PhD studies at Canterbury University at the time.

Q. Yes.

A. Myself, my husband Nigel Newman who works for CRL Energy and another PhD student David Titheridge. Subsequent to that there were Master students getting involved. This was a period in the 1980s of what we call the coal resources survey when the government was putting a lot of investment into clarifying and quantifying all of New Zealand's coal resources. Now they didn't directly fund work at Pike River coalfield but because all of that was going on, the context of that time there was a lot of student post-graduate research and also semi-commercial work by those post-graduate students into a lot of coalfields around the country.

Q. Including yourself in relation to Pike River?

A. Yep, yep, mmm.

Q. Now I think it's clear that in 1983 the first of what are called the Pike River coal drill holes were –

A. Yes.

Q. – carried out at the coalfield.

A. After two years of outcrop sampling really Terry who had gone on through Otter Minerals and a couple of company names and eventually it became called Pike River Coal Company, everything that could be reasonably achieved in outcrop had been done so there were six drill holes sited and drilled down to between 30 and 50 metres below the Brunner coal measures and that was 1983.

1625

Q. Now you said before that in 1988 things moved on a bit?

A. Yes, the park boundaries I think had been determined, the license had been taken over by New Zealand Oil and Gas. We made some approaches to that company and exchanged or provided some of the archival information. There was continuing correspondence but not really a very close relationship. However we carried on and now I'm talking about the Canterbury Coal Research Group which was a

gathering of postgraduate students, post doctoral fellows, led by myself and housed within the Department of Geological Sciences at Canterbury University. We had two masters students begin work at Pike River Coalfield at the end of the 1980s. We also had post doctoral work going on and a PhD student who was looking at the industrial properties of New Zealand coals. Now for his work we needed what we call pristine samples, which is coal samples that have been recently drilled. Coal is very reactive and when you store coals the properties change quite quickly. The Ministry of Energy funded us to drill a hole at Pike River Coalfield to obtain these scientific samples. That was drill hole 7 and that went right through the Brunner in Paparoa coal measures into the volcanics at the base.

Q. And you may have said this but I think that was 1993. Is that right?

A. No, Pike River drill hole 7 would've been about 1990.

Q. Thank you, sorry, my mistake. Now it's clear from your submission that in 1993 there were another series of drill holes?

A. Yes, now I had gone on then to CRL Energy which was a condition of continuing to receive government research funding. And those six holes were drilled in relationship between New Zealand Oil and Gas and I believe Mitsui Mining. I was not involved in that drilling programme.

Q. In 2001 I think you next became involved with –

A. Yes.

Q. – Pike River Coalfield?

A. We had done some microscope analysis of coals. Coals are typically characterised using the microscope, which is called petrographic analysis. We continued to do some of that work through the 1990s on a commercial basis. But in 2001 Gordon Ward, who was CEO of Pike River Coal, approached me directly to say could I coordinate a study into the risks of acid mine drainage at Pike River Coalfield because this had come up as a potential environmental problem and the Department of Conservation were funding studies, independent studies, to see how serious that risk was and the company wished to do some of their own work on this. So that was undertaken by myself, my husband

Nigel Newman, who is geochemist. He and I were still working in these related or complimentary areas but by then I had started the Newman Energy Research Consultancy while he was still with CRL Energy. The other person involved in the acid mine drainage assessment was Phil Lyndsay who worked for one of the geotechnical companies. Now in the course of that work I was invited to evaluate the existing Pike River Coal database, the drill hole data principally, some of the pre-mining feasibility studies and at that time also Murray Cave was working on similar things but for the Department of Conservation. Gordon suggested, as we had expressed some concerns about the adequacy of the geological database, he invited us to look at everything, all the holdings. These were sent to Christchurch from Sydney and –

Q. To you?

A. Yes, no actually to Peter Gunn, who was working on contract for New Zealand Oil and Gas in the development stages of the mining feasibility studies and for the permitting applications. Now Peter Gunn was operating as a private consultancy on contract to New Zealand Oil and Gas. So these holdings were sent to him and both Dr Cave and myself went through a very large amount of data. We –

Q. Just before you go on. When was this?

A. This was 2001 and it was at the same time as the evaluation of the acid mine drainage risk.

Q. Right.

A. And this was an opportunity for us to see everything that had been done.

1630

Q. And this is in the context, so we're all orientated, this is in the context of Pike River Coal's application to obtain a – to be granted an access arrangement from the Department of Conservation -

A. Principally it was in relation to the access consents –

Q. – and the consents yeah?

A. – which had not at that time been obtained. Department of Conservation were concerned and were undertaking

these independent studies including Dr Cave's work. Now in the course of evaluating that database which is a significant part of the timeline, because it did give me an opportunity to become completely up to date with all the information at that time. I did say to Gordon Ward that I felt that the geological detail within that database and particularly the way it was expressed in cross-sections and maps. I thought that was sketchy at that time. I did not discuss this publicly but I did put this in writing to the company themselves. After the work on acid mine drainage risk I was again somewhat distant from what was going on on the licence. Again there were some commercial coal analyses and providing archival information that I had, that –

Q. This is from you –

A. Yes.

Q. – to Pike River Coal?

A. Because of my long history there I had a complete database going right back to the early sampling and drilling and from time to time pieces of that information would be needed because they were not available or had been lost and I would make copies available and really from 2001 to 2006 that was the extent of my involvement. In 2006 Jonny McNee who had been working with Solid Energy as a coal geologist and who had been taught by me as a post-graduate at Canterbury University, Jonny moved to Pike River Coal in 2006 as mine geologist essentially or exploration geologist, both really, he got in touch with me and said he'd been looking at the more recent drill hole data which I hadn't seen. He felt that complexities were appearing that had not previously been known, he was concerned that it was necessary to try and obtain a geological understanding or explanation of some of these complexities and he thought perhaps the kind of work that I do, which we'll talk about later on stratigraphy and depositional modelling, modelling of seam geometry, it would be timely to look at doing that at Pike River. We didn't immediately move on that but at the beginning of 2008 I saw some coals from drill hole 34 and also some of the chemical analyses from drill hole 34. Now this had encountered not a typical seam, but a

seam with intersections of sediment which is not unprecedented but it was very notable in that drill hole. When I saw the chemical data it was apparent to me that those sediment partings were always part of the seam, they were not to do with faulting. Now what you find very often in –

Q. Just before you go on.

A. Oh, sorry.

Q. We'll get into the specifics –

A. Quite, okay.

Q. – in a moment, but at the moment I think the important thing to bring out is the timeline. So we're talking about 2006 when your former student Jonny McNee moved to work for Pike River Coal Limited and I think you were engaged or your company was in 2008 –

A. Yes and the reasons that's important is once again it gave me the opportunity to become up to date with the database as it had developed through, through the 2000s and we did produce a stratigraphic model by June 2008 and Jonny actually resigned from Pike River Coal in July 2008.

Q. So your proposal, as I understand it, was in two phases, phase one was completed and phase two was not?

A. That's correct. Phase two was to test the model. The model was provisional model, the best achievable with the available evidence, but still really at the idea stage. It needed testing with dating of the coal measures and perhaps the reason for that will come out later on.

1635

Q. Now, just so again we can complete this time frame for your involvement, as I understand it you continued to provide really informal information and answers to Pike River Coal Limited through until about mid 2009?

A. That's correct.

Q. And from that point on you had no informal or formal contact or engagement with the company?

A. That's correct, because phase two of my original proposal in 2008 had not made any headway I wasn't formally involved, however the Pike River Coal geology staff and also their geological contractors commonly would contact me with questions.

Q. Right.

A. And these questions related to the way in which my model might answer some of their current questions. Now, for nine months or so did do my best to answer those questions. I commonly did this by email and would have in the email, "This really isn't a definitive answer if we don't test the model, then we can't be sure, we really need to test the model," and I said that a number of times, now in about July 2009 I did become concerned that I was being frequently asked to make statements that I considered poorly founded and I said at that point I do not wish to informally make answers because it felt to me as though I was endorsing an approach to the geology that I considered was – I'll try to find a polite way – well, inadequate really, so I really heard very little after about July 2009 because I had somewhat distanced myself.

Q. So in terms of your knowledge of the database of drill hole information and data, that would have ceased I take it in 2008 when you last reviewed it?

A. Yes, that's correct.

Q. Now, as that brief timeline has demonstrated the area in which you work is a technical one which many in this room will not understand necessarily at first blush, so I wonder now whether you are able to start giving us a bit of an education as to what it is that you do and perhaps first a basic introduction to geology and how it is that coal for example comes to exist?

A. Okay, I have some visuals.

Q. Yes we do.

A. Now, some of these have been obtained from Peter Whittall's submission so I acknowledge that is where I got some of the photographic material from and thank you for that.

Q. Just pause. We'll just confirm that that's I take it via the Royal Commission's secure website?

A. That's correct, that's right.

Q. And exhibits or annexures that have been provided by Mr Whittall on behalf of Pike River Coal?

A. That's right, yes, there are three figures, two of them are just photographs of the coalfield and one explains the inseam drilling.

Q. Well, perhaps if we can start then, I think the first one that you want to refer us to is a photograph of the western escarpment?

A. PW4.

Q. Yes, PW4, that's the document reference. We can see that there?

A. Most people would have seen this in the newspaper, it's the west facing escarpment of Pike River Coalfield, it's taken here at about two kilometres north of the most southern extent of the coalfield. The coalfield extends for about seven and a half kilometres from south to north and here you can see Hawera Peak there and the north ridges here, those north ridges are the northern boundary to the coalfield. The Hawera fault runs along just to the east of Hawera Peak and down out of sight, the Hawera fault is a major boundary, it is a thrust fault, on the eastern side the basement granites and Gneiss are up-thrown.

Q. Just pause, can you just explain some of those terms for us please?

A. Yes, again people would have read that the 2.3 kilometre stone drive access way into the pit bottom was through Gneiss, which is a kind of granite which is the crystalline basement rock, the sort of thing you use for building, so that is up-thrown at least a kilometre on the eastern side of the coalfield and forms the eastern boundary.

1640

Q. When you say, "up-thrown", what does that mean?

A. The thrust fault is part of the Paparoa Range fault system which has some very major structures, geological structures, where different parts of the crust have been up-thrown by varying amounts. So, yes, that's just a particular technical term but a thrust really means that old rocks

have been pushed up over younger rocks, yeah. We'll see that on the cross sections later.

Q. Thank you.

A. So what we did in 1980 was we flew in - the most practical way to access the area is by helicopter. The road which Pike River Coal have put in relatively recently, up to the mine infrastructure doesn't, I think, go to a very large elevation. So in terms of access now to these outcropping areas or for any further drilling that would still be helicopter supported. So our first camp was up here in about this area. And I think the next one, which is –

Q. Just before you go on we just need to get this down on the record. You have referred to a couple of points there, we probably need to describe them in relation to this photograph. You camped at the left, on that photo the left –

A. Yes, you see we got Hawera Peak and then there is this west facing slope down to the top of the escarpment and the camp was just there, yeah.

Q. So the Hawera Peak is, I'm estimating –

A. The highest point –

Q. – the highest point we can see in that photo?

A. It is, and it really is north of the present license boundary.

Q. And you camped, in terms of the photograph again, down to the left of that?

A. Yes, on the edge of the escarpment.

Q. Edge of the escarpment.

A. Just here.

Q. Okay, thank you.

A. That escarpment faces out towards Punakaiki.

THE COURT:

Q. So you're at the northern end of the escarpment where you camped?

A. We were at the northern end of the escarpment just before Hawera Peak but if you continue now further north beyond the present

limit of the license there are further bluff exposures but just not as dramatic as these ones.

EXAMINATION CONTINUES: MS BEATON

A. PW5 has got some of the geological horizons.

Q. Yes and that's up there now I think?

A. Okay.

Q. Now again this is a document that was obtained, or provided I'm sorry, by Mr Whittall on behalf of the company, yes?

A. That's correct, mhm. Right now the –

Q. And before you continue sorry?

A. Yes.

Q. The markings that are on there and the lines and the references, they're not yours are they?

A. No these were put on by Pike River Coal. This image, or similar images has appeared in the press and in various company publications to give an overview of the geology of the license area. I'll now define one or two things. Coal measures, when we talk about the geological units here we talk about Brunner coal measures, Paparoa coal measures. Some people will already know that the term, "coal measures" which is a very old term, it relates to not just the coal seam but to all the sedimentary horizons that the coals occur within. So, "measures" is a very old term to talk about rocks essentially. Now the sediments that we can see at the top of those bluffs above what's marked here as the Brunner Seam, that's the island sandstone, that's a succession of sands that were deposited in a marine environment. That unit is named for the island in the middle of the Gray River by Taylorville. Those sandstones are about 40 to 45 million years old and that puts them in the air scene**.** The Brunner Seam as shown there is really what we would refer to as the Brunner Coal Measures Horizon. There is a high proportion of coal but there are also some sediments above and below that seam. And then underneath the Brunner Horizon are the much thicker Paparoa coal measures. Now these are much older. The Paparoa coal measures are

cretaceous in age, which are 70 million years plus, age of the dinosaurs. There is a major period of time missing between the Paparoa coal measures and the Brunner coal measures.

1645

A. At Greymouth we have a very similar sequence and the Spring Creek coals and the coals from the Roa Mine are taken from the Paparoa coal measures. Now at Pike River we do have Paparoa coals. Here it's shown as the Paparoa seam, that's a bit of a over simplification. There are a number of seams in the lower part of the Paparoa coal measures at Pike River. They tend to be discontinuous. I won't say too much about those, so that gives a really an overview of the geology. You can see those beds are dipping to the right, to the east. The structure of the coal measures is such that we see here the escarpment looking west and then there is what we call the dip slope and we'll see that in the cross-section. The dip slope is still rather steep but relatively gradual descent that you can't see because it's on the other side of the bluffs and that falls down towards the area of the pit bottom and the accessway, yep. A little bit about coals then. Coals are formed from deposits of peat. I've got a page in my submission which talks about some of these things, it's page 5. You need a lot of peat to form a seam of coal and you need to preserve that peat, that plant material which you achieve by having a high water table. If you can have a high water table either because you have proximity to a body of water like a lake or the sea or you have a lot of rivers running through the area or even just a very high rainfall, any of those will allow you to accumulate thick deposits of peat. If you want them –

Q. Just pause there sorry, Dr Newman. We don't have the diagram up yet so –

A. No.

Q. – before we keep going, is it one that you've referred to.

A. No, we -

Q. It's not, my apologies.

A. - this is to, no, no that's fine. Just to explain how the coal is formed –

Q. Right.

A. – there were one or two questions about that.

Q. Yes.

A. So if you are going to accumulate enough peat to form a coal seam this takes tens of thousands of years or even hundreds of thousands of years and of course you have to have some subsidence for that thickness to be preserved and that is what has happened on the West Coast and then you need burial to coalify that peat to the ranks that we see today. Now that happens a number of kilometres below the ground surface in subsiding basins but that, then that all gets pushed back up again so that we can see it today so those coal measures that we saw in the photographs have been buried to depths of two to three kilometres and have been pushed up that amount in the relatively recent geological past.

Q. And just while we're on, back on this photograph, you referred before to outcropping, that the measures outcrop here. What does that mean?

A. It means they're exposed at the surface. You can actually walk up and sample them with rock hammers.

Q. Which is indeed what you and others did –

A. We did that in the early eighties. The problem with that is you don't see what is under the surface and you can't get fresh coal samples. Okay, so -

Q. Just before we go on.

A. Yep.

Q. And this is a very basic question again my apologies but how, can you explain to us in general layman's terms how it is that gas becomes a feature of coal?

A. During coalification you can generate gas by a number of means. The kind of gas that we're referring to in these coking coals is thermogenic, it's formed as a result of coalification at depth and high pressures and temperatures. You can also form gas biogenically at shallower depths where micro-organisms actually inoculate coals, usually lower rank coals in ground water, sometimes to considerable depths of maybe 800,

1000 metres and they almost feed on the coals and produce biogenic gas which is similar compositionally but not identical, yeah. In the case of the gases we're concerned about here it's definitely thermogenic, a result of coalification, yep.

1650

A. In the 1980s we drilled those six holes in the down-dip area, now this is important because until that time we were seeing the coal in outcrop and typically we were dealing with a seam varying from three to 12 metres thick usually at least eight metres thick and it appeared somewhat continuous in outcrop and relatively uncomplicated except in the very south and north. But, as soon as we drilled in that down-dip area to the east, we found that the situation was very different. The seam there was still sometimes thick, but then there was an interval above the main Brunner seam of sediments that we refer to as the interburden. Now those are sandwiched between the Brunner main seam and what we call the Rider seam. Now the Rider seam is a thin seam which is discontinuous and often very high ash and that separates the Brunner horizon, the Brunner coal measures from the island sandstone at the top of that picture. So, at the time the coal measures were accumulating, eventually we had marine transgression, the sea came in and inundated that area and the Rider seam is the last gasp of the peat accumulating mire. A mire is a general term for a peat accumulating environment. So the last gasp of that Brunner mire when the sea came in produced the Rider seam and the sediments that separate the Rider seam from the main seam I call that the interburden, they vary in thickness from a few metres to eight or nine metres, they very sedimentalogically they vary in appearance. So that is what we found in those six drill holes in the dip-slope are much more complicated picture that in outcrop.

Q. And to clarify this photograph PW5, doesn't show a Rider seam? It has no –

A. No, I mean even if you could see it by going up close to it, you do not see the Rider in outcrop and it does give the impression of a very simple geological situation. Yeah. Now shall I define stratigraphy?

Q. Yes please.

A. It sounds scary but it's not really. Stratigraphy describes the variation in thickness of coal and rock units. Not just the variation in thickness, but also the relationship between them. Now something we see in the West Coast particularly which has had a complicated geological history is that coal seams will pass laterally quite rapidly into sediments. So what's happened and we'll have some pictures in a minute, is you've had your mire environment with peat accumulation, but at the same time you've had maybe streams running through that mire depositing sediments. So at the same time you've got peat and sediments accumulating and you can go from coal, clean coal into sediments laterally within the mine over very short distances, of sometimes only 50 metres. Now I'm not speaking specifically of the Brunner coal at Pike River here, this is a general statement and these sorts of relationships are what we call stratigraphy. And this contrasts with what you will more commonly hear about and have heard a lot about over the last two days which is the effect of faulting. Now faulting happens usually later and including during this uplift phase you get a lot of fracturing, so we call that structural complication as opposed to stratigraphic complication. The stratigraphic complications arise at the time the deposits were accumulating, yep. Okay. I've got some diagrams to illustrate one kind of stratigraphic complexity that is relevant to the Brunner main seam.

Q. Yes.

A. At Pike River.

Q. That's the one we can see there is it?

A. That's correct.

1655

Q. So that's – just before we go on, that is document NEW014, page 1?

A. That's right, so I'll start with the legend, now I have simplified the stratigraphy here. Instead of showing the Rider seam and interburden which occur above the Brunner main I have just called everything above the main seam overburden, so that we don't have to worry about what's above. The peak mire we've talked about that, the sedimentary parting, top right, is what we're about to explain.

Q. Yes.

A. And local basement is actually the Paparoa coal measures which we've talked about with the photos and the blue there is to represent where streams are flowing through the mire. The green line is to indicate faulting, that won't come up until quite a bit later and neither will the workings so if we could have figure 1, okay, we've got it twice.

Q. Could we just focus on the lower, now just before you go on though Dr Newman, can you just describe what you mean when you've said there that there's considerable vertical exaggeration?

A. Yes, now the problem representing any geology is that you are often focussing on an interval which is quite thin so in the case of the Brunner coal measures we might be talking 10, 20 metres of thickness and there can be a lot of busyness within that 20 metres but in terms of the lateral extent we might be talking two kilometres, so if you do a cross-section in true scale and that means that the vertical scale showing the thickness is the same scale as the horizontal scale then you have this problem where the Brunner horizon just becomes a little boot strap which is so thin that you can't see really what's going on. So, in geology we will often apply vertical exaggeration where the vertical scale is different from the horizontal scale and that really is essential to see what's going on. Okay, so all we're seeing here is the Paparoa coal measures producing a local surface and that surface is what the Brunner horizon sits on, so the grey – that is the peat deposit, so we're not talking now, we're talking back 45 million years ago when the peat was accumulating.

Q. And the Paparoa measure that you're talking about, is that what we see in the purple?

A. That's correct.

Q. In either corner of figure 1?

A. Yes, so that would have been an undulating surface with some relief, little hills, little streambeds and peat accumulates on top of that. Now, I have simplified things but that is sufficient and where we have the mire, the green is the plants growing and there is the river channels, the streams that were running through the mire.

Q. That's in the blue?

A. Yes. Now, these streams are depositing sediment so here's these lenses of sand and they have deposited onto the peat surface.

Q. And they're shown in the brown, is that right?

A. They're brown. So, this is time 1. So if we have figure 2, and you probably can't show them both together so you try and remember that so we've just seen this bit up to there. Now, what happened after that is the streams went somewhere else and we have another layer or bed of peat deposited above those sand streams if you like. Now, if you're interested in scale we don't really have enough drill hole data to say how extensive these sand lenses are within the seam. So, that's important that we don't know that. What we do know is that they will be almost floating or isolated within the coal body. So, at the end of the accumulation of the Brunner main seam and we still have the green on top for the mire, that is what we have. I think figure 3, have a look at figure 3. Yes, okay, after that the overburden, that's it, yeah.

Q. Yes, which is shown by the pink layer?

A. Yes, the pink layer and the blue at the top represents the sea.

Q. Right.

A. So that is the end of the depositional phase. Now, we'll come back to this sequence at the end where we will look not how it was then, but how it might be now but we have some other things to do first.

MS BEATON ADDRESSES THE COURT

LEGAL DISCUSSION (17:01:02)

COURT ADJOURNS: 5.05 PM