



Trade &
Investment
Mine Safety

Investigation report

Cause and circumstances of fatal injury to
Peter Thomas Jones at Chain Valley Colliery
on 3 June 2011

Extract of report prepared by the
NSW Mine Safety Investigation Unit

Title: Investigation Report
Cause and circumstances of fatal injury to Peter Thomas Jones at Chain Valley Colliery on
3 June 2011

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Summary

Purpose of report

This report concerns an incident that resulted in fatal injuries to Peter Thomas Jones on Friday, 3 June 2011 at Chain Valley Colliery.

Incident

Chain Valley Colliery is 48 kilometres south of Newcastle. The mine is operated by LakeCoal Pty Ltd under 100% ownership of LDO Coal Pty Ltd.

Mr Jones, an employee of LakeCoal Pty Ltd, was an experienced Mine Technician. He was also the site Check Inspector representing the workers in matters relating to safety. Mr Jones was operating a continuous miner in the West 6 pillar extraction panel in the Fassifern seam.

At 1.55pm a 4.8 metre slab of coal fell from the rib (wall) onto Mr Jones. The slab broke in two when it hit the ground and Mr Jones was trapped under a 2.3 metre piece weighing about 1.3 tonnes. The crew freed Mr Jones within eight minutes of the incident. Mr Jones was taken to pit bottom where he was having difficulty breathing. Mr Jones was transferred to a drift dolly car for transport to the surface and was given CPR from his co-workers.

At 2pm, the Ambulance Service responded to a phone call from Chain Valley Colliery. At 2.08pm the NSW Police Force was notified of the incident. At 2.11pm the first ambulance paramedic arrived at surface pit top and further paramedics arrived at 2.18pm

At 2.44pm the first paramedic had contact with Mr Jones when the drift dolly car reached the surface of the mine. Ambulance records indicate Mr Jones's condition was Code 2 (in arrest) with CPR in progress. Mr Jones was taken to Wyong Base Hospital. Mr Jones was declared deceased at 3.11pm.

The department engaged geotechnical consultants SCT Operations Pty Ltd to assist with the investigation. The SCT report describes the rib failure:

It was observed that the slab which fell on Mr Jones did not contain any rib bolts as were observed inbye and outbye of the fallen section of rib. The fallen slab was wedge shaped and had very weak natural support as it was bounded by several planes of separation. A very thin column of coal at the base of the slab was the only material supporting the weight of the slab in place. The final impetus to this slab toppling over by gravity was considered to be induced vibrations from the movements of the machine operated by Mr Jones.

The Safe Standing Area Plan for single-sided lifting utilising two breaker line supports indicated that Mr Jones was within a safe standing area provided the rib side was supported by the mine's rules, as required, at the time of the incident.

Ultimately the cause of the incident was that the slab of rib coal was not adequately supported (bolted) as required by the documented Pillar Extraction Management Plan or Authority to Mine.

Cause of death

The autopsy identified the cause of death of Mr Jones to be multiple injuries.

The pathology summary noted Mr Jones to have sustained soft tissue injuries to the trunk and legs. Internally Mr Jones had severe pelvic injuries and chest injuries including rib fractures and traumatic haemopericardium (A collection of blood in the pericardial sac surrounding the heart) resulting from a lacerated pulmonary vein.

It was identified that the overall pattern of injuries was consistent with a crush injury and that the pattern of injuries was non-survivable, even with immediate medical attention and would have rapidly and inevitably been fatal.

Circumstances of the incident and systems of work

During the development of West 6 Panel, LakeCoal engaged geotechnical consultants to review the roof and rib support rules. As West 6 Panel developed beyond 14 cut-through, the rib support specifications were revised in preparation for secondary extraction of the panel. The Manager of Mining Engineering told investigators that the West 6 panel ribs between 1 and 14 cut-through were not supported to the same standard as those ribs inbye (towards the coal face) of 14 cut-through. Secondary roof support between 1 and 14 cut-through was installed afterwards to the design standard recommended by the consultants.

There were six significant reported incidents involving rib spall (rib failure) in West 6 Panel before the 3 June incident.

In the four weeks before the incident, weekly production audits were conducted four times by three separate deputies in West 6 panel. All four documents reported that the ribs were adequately supported in the active mining zone of West 6 Panel including the incident area. Three of the audit documents had been countersigned by Undermanagers even though two Undermanagers told investigators that they did not participate in the audits at the incident scene. It was a requirement under the West 6 Pillar Extraction Management Plan that Undermanagers take part in the audit team ("The audit team, at a minimum, will include the Undermanager, Unit Deputy.")

The investigation identified that on at least one occasion before the incident a deputy had asked contractors to install additional rib support. On 9 May 2011 an undermanager reported that equipment – including rib bolts – were removed from 6 cut-through West 6 Panel to the main headings. On 21 and 22 May contractors were installing secondary roof support in B Heading 5 to 6 cut-through. This is the section of roadway where Mr Jones was crushed.

On 24 May 2011 the Authority to Mine for West 6 Panel, outbye of 6 cut-through, was signed by management. The authority identified that secondary rib support

was to be installed and mid angle structures (leaners) were mapped at a shallow angle to the heading in both roof and rib.

On the night shift of 3 June a deputy reported production delays due to a rib fall that stopped a shuttle car from using the road. Six metres of loose rib coal was knocked down using a load haul dump machine. Two large sections of unsupported rib between 5 and 6 cut-through in B Heading were in the road that was used to access the mining area on the night shift of 3 June.

Post-incident inspection by SCT Operations identified the two areas of unbolted rib in B Heading 5 to 6 cut-through (including the incident area). SCT Operations also identified outbye (away from the coal face) of 5 cut-through 21 areas of rib that did not contain rib bolts as per the requirements of the Pillar Extraction Management Plan.

On the day shift of 3 June and before the incident occurred, three management supervisors visited B Heading between 5 and 6 cut-through during mining operations. At the time of writing, no documents noting non-conformance had come to the attention of the investigator, regarding sections of unbolted rib in B Heading 5 to 6 cut-through. Coal production continued up until the time of the incident. Post incident inspection by a geotechnical consultant mapped 156 areas of rib spall in West 6 Panel between 1 and 6 cut-through. Five rib spalls were of volume greater than 1.5 metres³ and 11 rib spalls of volume between 0.5 and 1.5 metres³.

CONTENTS

Summary	i
Purpose of report.....	i
Incident	i
Cause of death	ii
Circumstances of the incident and systems of work.....	ii
The report	6
The department's authority	6
The mine	7
Brief history of the operation	7
Mining method	8
History of West 6 Panel (rib and roof support)	9
Details of Peter Thomas Jones	10
The incident	11
Rib failure at West 6 Panel 3 June 2011.....	11
Photographic record of the scene.....	12
Dimensions of slab and failure mechanism.....	22
Witness account of the incident.....	24
Injuries, rescue and treatment	24
The autopsy report and analytical toxicology report.....	24
The rescue of Mr Jones	24
Method and equipment used to free Mr Jones	25
First aid for Mr Jones.....	25
The Emergency Management System	25
Cause of the incident	26
Nature of strata in West 6	26
Systems of work.....	26
Strata Failure Management Plan.....	27
Pillar Extraction Management Plan	28
West 6 Weekly Pillar Extraction Audit	28
Audits and inspection by mine supervisors in West 6.....	29
Authority to mine	29
Development of a Trigger Action Response Plan for strata failure.....	30
Fassifern West 6 Secondary Support Rules.....	30
Supervision on the shift of the incident.....	30
Development of safe standing zones at Chain Valley Mine	31

Occurrence of unsupported rib in West 6 outbye 6 cut-through	31
Factors affecting rib stability	35
Undermanagers and deputies reports related to roof and rib bolting in West 6 Panel...	36
Role of the department before the incident	37
Post-incident actions of Chain Valley Colliery	38
Post-incident actions of the department	38
Initial incident response	38
Investigation	38
Functional Testing of continuous miner 2096 and remote	38
Communication with family members	38
Revocation of approval for extraction of coal	38
Other notices issued on Chain Valley Colliery by the department	39
Safety Alert SA11-08 Fall of rib results in fatality	39
Current status of crush injury management, training and information available to the NSW mining industry	39
Findings	40
Attachment 1	43
Incident Plan 1 Colliery Holding and Seam Workings (Plan Number C40036_1).....	43
Attachment 2	44
Incident Plan 2 Fassifern Seam Workings (Plan Number C40036_2)	44
Attachment 3	45
Incident Plan 3 Fassifern Seam – West 6 Panel (Plan Number C40036_3).....	45
Attachment 4	46
Incident Scene Plan Location of Sections AA, BB, CC (Plan Number C40038_1).....	46
Attachment 5	47
Incident Plan 10 West 6 Hdg 3-6CT Profile (Plan Number C4B0036_10).....	47
Attachment 6	48
Incident Plan 8 Incident Scene Plan (Plan Number C40036_8).....	48
Attachment 7	49
Incident Plan 8A Incident Scene Profile (Plan Number C40036_8A)	49
Attachment 8	50
Incident Plan 7 West 6 Completed Mining Sequence (Plan Number C40036_7).....	50

The report

The department's authority

The Department of Trade and Investment, Regional Infrastructure and Services administers the *Coal Mine Health and Safety Act 2002* (CMHSA) and the *Mining Act 1992*.

Under the CMHSA a coal workplace is defined as "a place of work to which the CMHSA applies." The places of work to which the CMHSA applies are listed in section 8 of the CMHSA.

The department has authority to investigate the incident as it occurred at an underground coal mine as defined by the CMHSA.

The department's records identify the location of the incident as 5 to 6 cut-through, B Heading of West 6 Panel, Fassifern Seam, which is within the Chain Valley Colliery Holding, ML 1051 of the Mining Act 1906.

The mine

Chain Valley Colliery (the mine) is 48 kilometres south of Newcastle. The mine is on the southern corner of Lake Macquarie about three kilometres west of Doyalson.

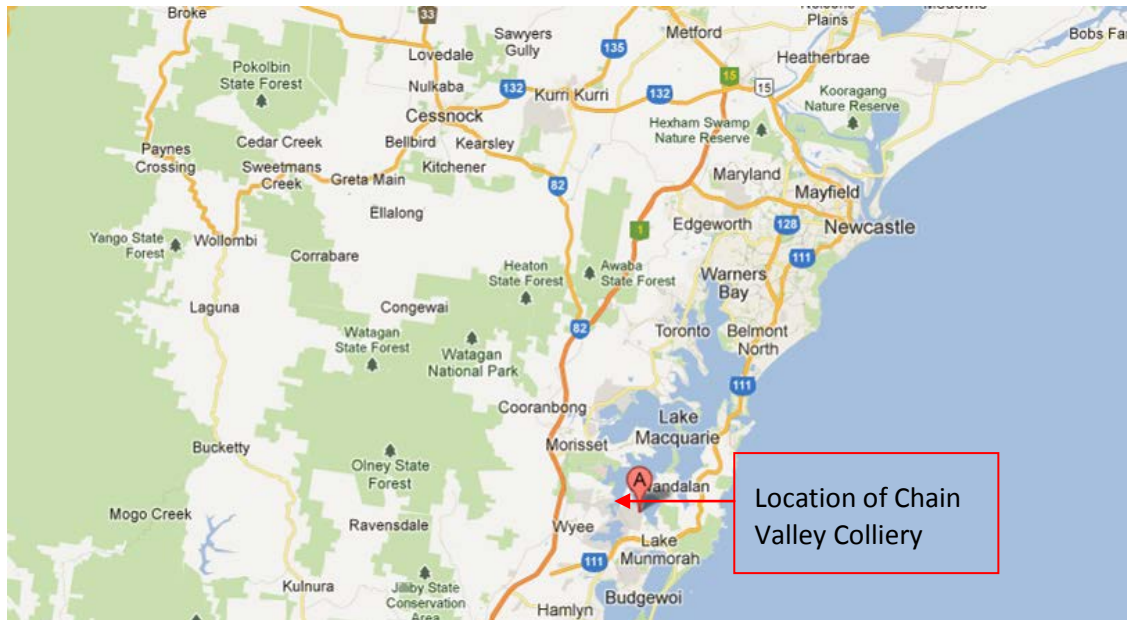


Figure 1 Location of Chain Valley Colliery

Brief history of the operation

Chain Valley Colliery was initially developed in the 1960s to provide coal for the Vales Point Power Station. In that time coal was mined from three seams: the Wallarah, Great Northern and Fassifern seams. Until recently the method of mining was the board and pillar method. At the time of the incident the mine was transitioning from board and pillar operations to mini longwall operations.

The department granted approval to LakeCoal Pty Ltd for the approval to extract Domain No. 2 by pillar extraction. The approval included condition number five:

Approval condition number 5:

Mine Safety

5.4 The Operator shall have a detailed support plan prepared and submitted to an Inspector. The support plan shall comply with the Mines Strata Failure Management Plan as per Clause 32 of the *Coal Mine Health and Safety Regulation 2006*.

5.11 The Issues included in chapter 5 "control" of the "manual of pillar extraction" shall be addressed to control the extraction process.

West 7 Panel was developed and extracted before West 6 Panel. The Domain No. 2 approved plan shows sub panels (West 6 A to West 6 D) to the left of West 6 Panel. These panels were not developed or extracted from West 6 as per the design.

Mining method

In West 6 Panel five sets of roadways were driven from main headings to develop the extraction panel. These roads were connected by mining cut-throughs perpendicular to the main roads – this created large blocks of coal known as pillars. The pillars created in West 6 Panel were typically 24.5m wide x 34.5m long. West 6 Panel developed 23 rows of pillars before partial extraction of the pillars began. West 6 Panel was not overlain by extracted workings in the Great Northern and Wallarah Seams. A cropped Incident Plan 2 Fassifern Seam Workings below shows the board and pillar method.

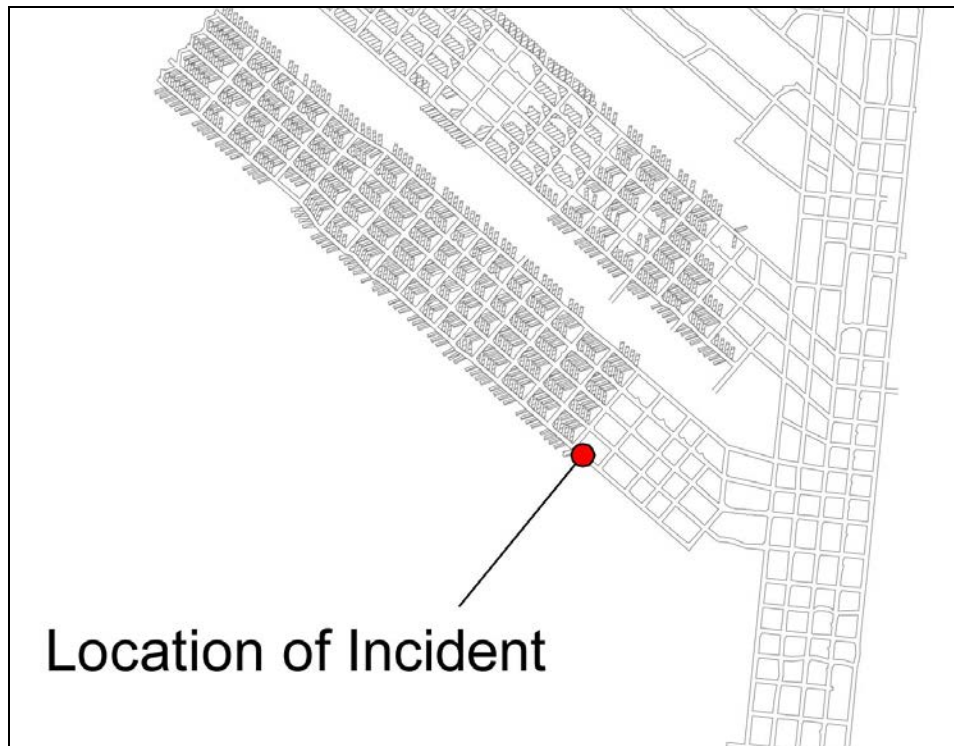


Figure 2 Incident Plan 2 Fassifern seam workings.

The partial extraction method was to create pockets in the pillars using a continuous miner. These pockets (also called lifts) were mined at an obtuse angle. Coal next to the pockets (fenders) was left behind to support the roof. This created a herringbone effect in the pillars. Two hydraulic breaker line supports were used to support the roof in the immediate vicinity of the continuous miner.

This method was used to prevent full collapse of the extracted void and to protect features on the surface from subsidence. The method also served to prevent premature roof failure in the extraction area.

Mine Design Guideline (MDG) 1005 *Manual on Pillar Extraction* was created as resource material by the department in August 1992 as a result of an increase in fatality rates associated with pillar extraction methods. The following is extracted from the MDG:

During the period May 1990 to June 1991 seven mineworkers were fatally injured during pillar extraction operations within NSW. These figures represent the worst period for fatalities in pillar extraction for over 10 years.

MDG 1005 provides clear guidance to mine operators concerning the management, inspection and control of pillar extraction operations.

History of West 6 Panel (rib and roof support)

West 6 Panel began development in March 2010. All primary roof and rib support installed outbye of 12 cut-through was by LakeCoal Pty Ltd employees. The primary rib bolting pattern that was used in the headings of West 6 Panel changed during the life of the panel, so some areas were supported differently to other areas. Chain Valley Colliery, through consultation with a geotechnical consultant, changed the primary bolting pattern on or about 26 July 2010 while the mine was developing 14 cut-through. This was for the purpose of alleviating the need for installation of secondary support during pillar extraction.

There were six documented incident reports related to rib falls in West 6 Panel before the incident:

1. 19/04/2010. During development, a 9 metre length of rib coal fell in 1–2 cut-through C Heading; Mr Jones documented a workplace safety hazard concern regarding the incident.
2. 15/05/2010. On development a person was struck on the head by falling coal while driving a continuous miner in F Heading.
3. 8/02/2011. During extraction at 21 cut-through B Heading a rib fall occurred crushing the continuous miner cable.
4. 5/03/2011. During extraction at 18-19 cut-through F heading a person was hit by rib from around a rib bolt causing a small cut to the hip.
5. 24/03/2011. During extraction in a right hand lift a piece of roof coal fell crushing the continuous miner cable.
6. 3/06/2011. On night shift on extraction in D heading a rib spall preventing access by the shuttle car to the continuous miner.

Chain Valley Colliery contracted two companies to install secondary roof support in West 6. As the mine had already installed primary support as per the geotechnical consultant recommendations inbye of 14 cut-through, contractors were only required to install additional support outbye of this mark. Documents provided by Chain Valley Colliery indicate that secondary roof support in the incident area (B Heading between 5 and 6 cut-through) was scheduled between 21 and 22 May 2011.

Installed rib support in West 6 Panel

For the purposes of secondary rib support outbye of 14 cut-through, secondary rib support was to be installed by contractors. Where 1.2 metre cuttable rib bolts were installed as primary support outbye 14 cut-through, additional 1.8 metre cuttable rib bolts were to be installed every 1 metre in the left hand rib.

The observed rib support hardware at the incident scene was 1.15 metre thrust fibreglass dowels (1.2 metre cuttable rib bolts, shear strength 75 kilo Newtons tensile strength 300 kilo Newtons). Attached to the rib support dowels were reinforced plastic plates. The dowels were anchored to the rib using a 1200 x 25 millimetre resin anchor. As only 1.2 metre rib bolts (and no 1.8 metre cuttable bolts) were installed in the incident area, it can be assumed that no secondary rib support was installed in B Heading 5 to 6 cut-through West 6 Panel.

Investigators identified that a 15 metre working section of rib at B Heading 5 cut-through (just outbye the incident scene) was not bolted. Investigators identified significant rib deformation within this unsupported zone. It was noted that an unknown person had painted the words "CLOCK IT" on the unbolted rib side. (A clockit is a device that is placed in the roof as an early warning system of roof failure.)



Photograph 1 Looking at 5 cut-through of the left hand rib noting that significant deformation and failure in the rib side and that the rib does not contain any rib bolts. Also note that a person has painted the words "CLOCK IT" on the rib to identify the placement of a roof monitoring device.

Details of Peter Thomas Jones

Mr Jones, an experienced Mine Technician and continuous miner operator, had been working at Chain Valley Colliery for about seven years. Mr Jones was the elected Check Inspector and was also a member of the Chain Valley Colliery Occupational Health and Safety Committee and regularly participated in workplace observations. Mr Jones had participated in training for the mine's management plans.

The incident

Rib failure at West 6 Panel 3 June 2011

At 1.55pm on 3 June Mr Jones was operating the continuous miner using a hand-held remote control unit.

The continuous miner was mining the first right hand side pocket in B Heading in 5 to 6 cut-through. Mr Jones was seen by a colleague at the time of the incident to be positioned inbye of the continuous miner adjacent to the left hand rib. Mr Jones was between the breaker line supports and the continuous miner underneath roof containing primary and secondary supports. Photograph 2, taken by NSW Police Forensic Services Group, depicts the incident scene with the slab Mr Jones was trapped underneath.



Photograph 2 Incident scene photographed by NSW Police Forensics on 3 June 2011.

As a shuttle car driver was approaching the continuous miner he saw Mr Jones's reflective clothing, "go over". He went to the aid of Mr Jones and was the first person to see Mr Jones trapped under the slab of rib coal. The cable hand was attending to the continuous miner cable on the opposite side of the machine to Mr Jones and was not aware of the incident until he was notified by the shuttle car driver.

Geotechnical consultants SCT Operations provided the department with a geotechnical report on the immediate strata and failure mechanism of the slab of rib coal. The SCT report describes the incident scene and the slab that fell on Mr Jones:

It was observed that the slab which fell on Mr Jones did not contain any rib bolts as were observed inbye and outbye of the fallen section of rib. The fallen slab was wedge shaped and had very weak natural support as it was bounded by several planes of separation. A very thin column of coal at the base of the slab was the only material supporting the weight of the slab in place. The final impetus to this slab toppling over by gravity was considered to be induced vibrations from the movements of the machine operated by Mr Jones.

Photographic record of the scene

The scene was photographed by NSW Police Forensic Services Group on the evening of 3 June and the Investigation Unit on 4 June.



Photograph 3 Looking inbye of B Heading from 5 cut-through towards continuous miner and incident scene.

Photograph 3 shows the roadway is stone dusted (white areas to prevent a coal dust explosion in the event of a methane gas ignition). Black areas in the rib side after the stone dust application shows where rib has fallen. Note on the right hand rib that a rubber bumper was installed to protect shuttle car cables rubbing against the rib side.



Photograph 4 Looking inbye of the continuous miner in the right hand side pocket and the fallen rib coal inbye of the continuous miner boom.

On the left hand side of Photograph 4 the fallen rib side involved in the incident is evident. The boundary is clearly defined by the white rib to black rib contrasts. The roof is supported with mesh and roof bolts. A roof monitoring "clockit" device can be seen at the top of the picture.



Photograph 5 Looking inbye of the fallen slab inbye of the continuous miner boom.

Photograph 5 shows the fallen rib slab adjacent to the left hand side of the continuous miner. Rib bolts and plates are evident in the still standing rib side.



Photograph 6 Looking inbye of the fallen slab underneath the continuous miner boom.

Photograph 6 shows the fallen rib slab adjacent to the rear of the continuous miner and the red oil drum.



Photograph 7 Looking inbye of the continuous miner positioned in the first right hand pocket in B Heading 5 to 6 cut-through.

Photograph 7 shows the exposed roof and rib in the right hand side pocket. The rib is not bolted in this area because it was freshly cut by Mr Jones and not required to be bolted.



Photograph 8 View of the incident scene on Saturday 4 June 2011 looking towards the area of rib slabbing and rib slab on ground. Photograph taken inbye of the continuous miner. Note the red oil drum and steel belt clamp used in the rescue of Mr Jones.

Photograph 8 shows the scene on Saturday 4 June 2011. Note the red number four painted on the remaining rib side adjacent to the continuous miner. This is the numbered position of left hand side pocket number four, as yet unmined.



Photograph 9 View rib showing the two bolt and plates in the white stone dusted area prior to the fallen area.



Photograph 10 View of slab showing the red oil drum and steel belt clamp on the right.



Photograph 11 View of slab showing the self rescuer of Mr Jones underneath the slab.



Photograph 12 Underside view of slab showing the position of steel belt clamp.



Photograph 13 Looking into the left hand rib pocket that had been extracted by Mr Jones before extracting the right hand pocket. First left hand pocket in B Heading between 5 and 6 cut-through.

The roof and ribs in the left hand rib pocket show no major deformation. In the foreground there appears to be fallen roof rock material.



Photograph 14 Looking inbye showing the position of the 2 breaker line supports in B Heading.



Photograph 15: Visible to the right of the breaker line support is the wooden link n lock chock built at the entrance to 6 cut-through B to C heading. A secondary roof support cable bolt and plate is in front on the breaker line support at the top of the photograph.



Photograph 16 Looking inbye of the right hand side breaker line support in relation to the start of the right hand side rib pocket.

Photograph 16 shows the floor material in front of the right hand side breaker line support.



Photograph 17 Looking inbye of the position of the two breaker line supports towards the goaf edge.

Photograph 17 shows the area behind the supports was open up to the roof fall in the last extracted left hand side pocket in 6 to 7 cut-through.



Photograph 18 View looking inbye of 6 cut-through inbye the breaker line support position showing rib support in left hand side rib and goaf edge at 6 cut-through in B Heading.

Photograph 18 shows the rib support effectively holding the white stone dusted rib side piece in place.



Photograph 19 Looking into the first right hand rib pocket showing the extent of over width extracted against the continuous miner.



Photograph 20 Looking outbye in B Heading of the right hand shuttle car.

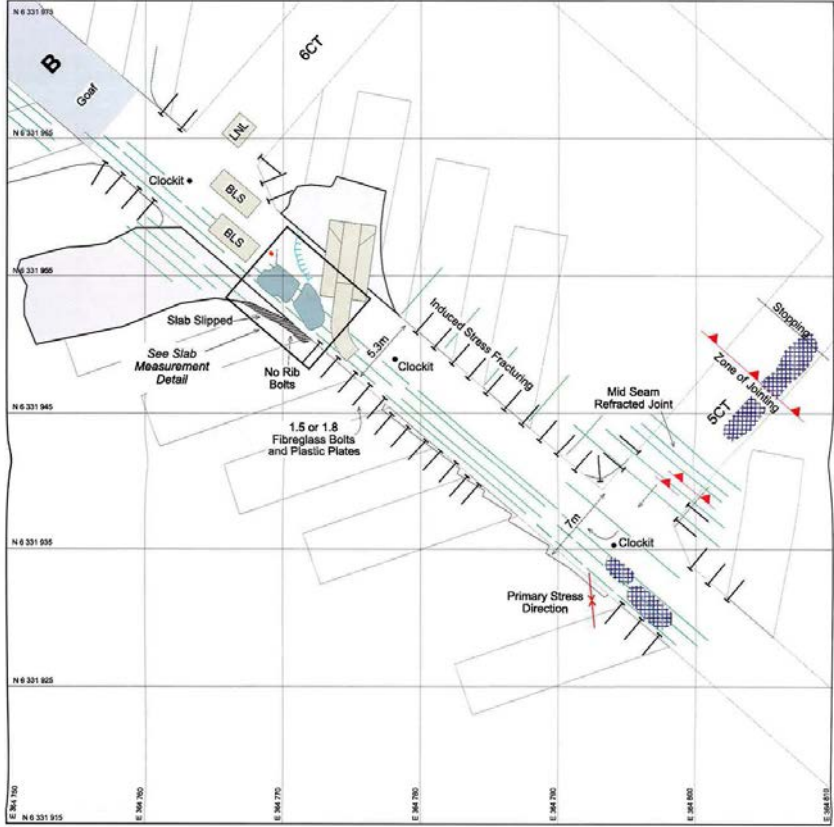


Figure 3 SCT Report Figure 2 Surveyed Incident scene.

Dimensions of slab and failure mechanism

SCT Operations' report (Figure 3) is a plan of the surveyed incident scene. It shows the left hand lift proposed position and the actual mined position. The actual mined left hand pocket was about 2.5 metres inbye of the design location. The right hand side rib pocket was oversized to the design. The plan also shows the position of the mobile roof supports and the rib support. An extract from the report has been included below. It explains the probable causal factors and mode of failure at the scene of the incident:

The rib side is considered to have toppled over as a single block which broke into two main fragments weighing approximately 1.3 tonne and 1.9 tonne respectively. The entire slab toppled over while the miner Mr Jones was operating (an Eimco Dash 3 miner) directly adjacent the area of failure. The failed slab was bounded by joint planes, both vertical and inclined, forming a wedge shape. The inbye side of the slab has the previous lift forming another parting surface. The C clay band forms the upper boundary. The entire slab was supported on a thin 10 cm thick column of coal as defined by the intersection of the joints. The only additional support came from a row of rib bolts but the remaining 4.8 metres of slab had no rib bolt support.

The final impetus causing the rib failure, while Mr Jones was present, is to be considered to be vibration and loosening of the heaved floor coal by the machine, destabilising the thin column of coal supporting the slab.

SCT personnel also included in their report a plan depicting the dimensions of the slab that crushed Mr Jones. Incorporated into this plan is a profile view of the left hand rib depicting the wedge shape described above. The plan also shows the relative size of the slab compared to the continuous miner and the roadway.

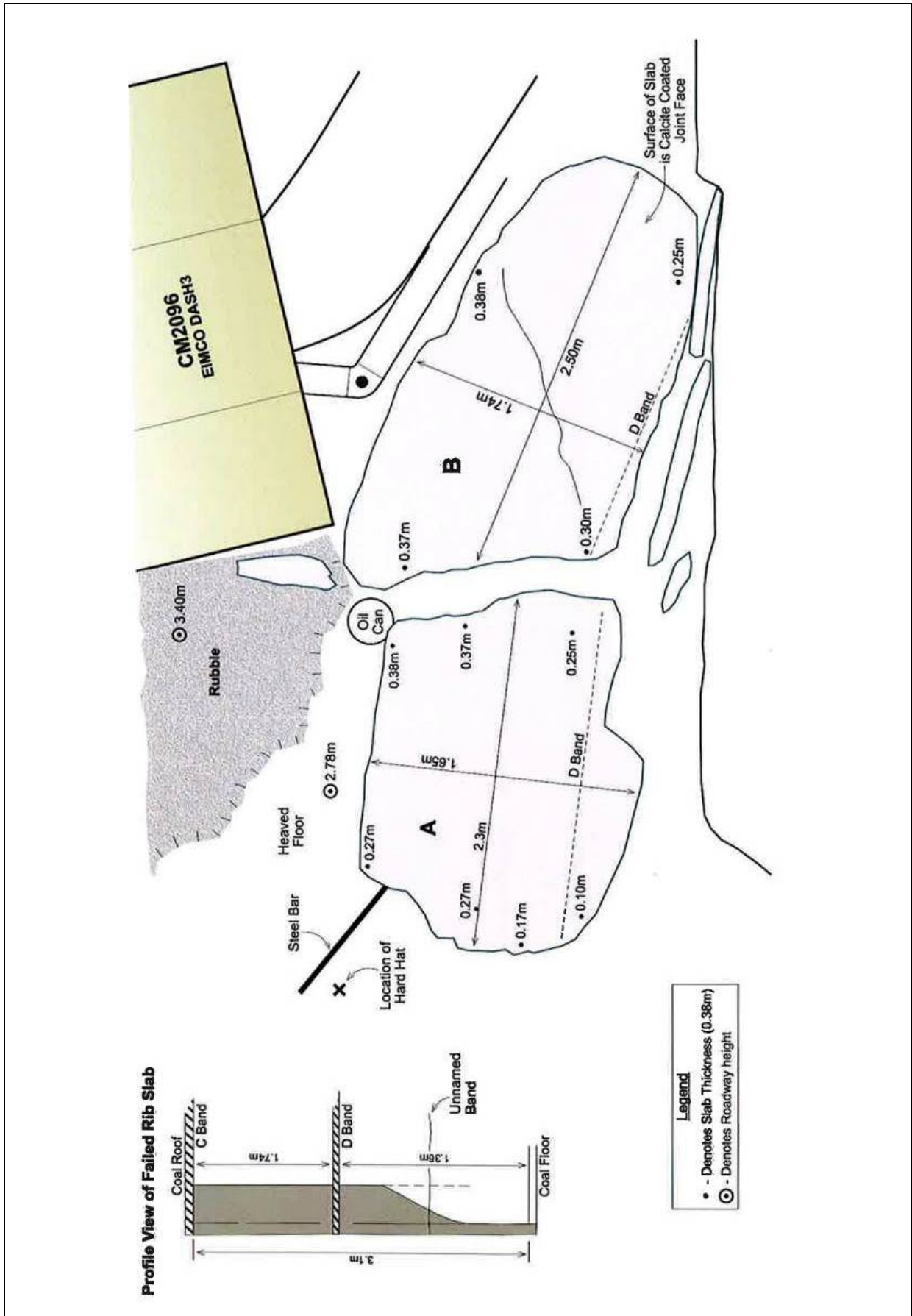


Figure 4 SCT Report Detailed slab measurements

Witness account of the incident

At the time of the incident a shuttle car driver was returning from unloading coal. As he turned the shuttle car into B Heading from 5 cut-through he saw Mr Jones's reflective clothing.

He told investigators he was on the left hand side of the rib going in.

"As I've turned around the corner and straightened up, I looked up and all I could see was the reflective stripes of the miner driver go over," he said.

"And straight away, I don't know if I turned the car off or not, but I've jumped out of the car and just raced up to him. And that's when I found Peter underneath a slab of coal.

At the time of the incident the cable hand was on the outbye side of the continuous miner adjusting the cable and did not witness the actual rib fall.

"I was around on the cable and the shuttle car came in. The shuttle car stopped and the operator of the shuttle car got off, come running up," he said.

"He had seen the coal fall out of the rib, on the right hand side of the miner, which I hadn't seen because I was busy pulling cable and making sure everything was right. I didn't hear anything out of, that made me think that there was anything wrong. I never heard PJ yell or anything like that.

"PJ was pinned under the slab of coal, from the waist down."

Injuries, rescue and treatment

The autopsy report and analytical toxicology report

The autopsy report identified that Mr Jones died on 3 June at Wyong Hospital. Due to the nature of Mr Jones' death the Coroner requested that an autopsy be performed to ascertain the direct cause of death.

The autopsy pronounced the direct cause of death of Mr Jones to be multiple injuries.

The pathology summary identified Mr Jones to have sustained soft tissue injuries to the trunk and legs. Internally Mr Jones had severe pelvic injuries and chest injuries including rib fractures and traumatic haemopericardium resulting from a lacerated pulmonary vein.

Analysis of Mr Jones's blood revealed that he was not under the influence of alcohol or drugs.

The rescue of Mr Jones

It would appear from accounts of co-workers that Mr Jones was trapped for eight minutes. The crew were aware of the issues with Crush Injury Syndrome and succeeded in attempting to free Mr Jones within 10 minutes.

Method and equipment used to free Mr Jones

There was no specific-purpose rescue equipment available to deal with the situation encountered by the crew. Crew members told investigators that they contemplated dismantling parts of the conveyor to obtain a lever with sufficient capacity to lift the slab. The equipment finally used was a 20 litre oil drum and a belt clamp that were found near the conveyor belt.

First aid for Mr Jones

At 2.03pm, Mr Jones was freed. The crew attempted to administer Entonox to assist with pain relief. Entonox is a self-administrable analgesic. Mr Jones had to breathe into a mask that would release a demand valve but because of breathing difficulty he could not break the demand valve. Mr Jones was put on a stretcher and taken to the crib room where a co-worker gave him Ventolin.

At 2pm a worker called the surface and said they were preparing to evacuate to pit top. It was reported that Mr Jones had crushed legs and possibly a crushed pelvis but they thought he would be all right.

The Manager of Mining Engineering told investigators that he heard the emergency siren sound about 2pm.

"The administration assistant confirmed there was an incident or accident in West 6 Panel and there was a miner pinned under a fallen rib," he said.

"The ambulance arrived and shortly after that several police officers were on site.

"Around that time we received notice from West Six that they had freed Peter Jones from under the fallen rib and were proceeding to pit bottom. The dolly car and two other operators were dispatched down to pit bottom to wait for the crew to arrive. Around that time I notified, or made phone calls to the District Mines Inspector and the District Check Inspector to inform them that we'd had an incident."

Mr Jones was transferred from the underground mine vehicle into the drift dolly car for transport to the surface. During this part of the journey Mr Jones received CPR from mine workers.

There was a concern that Mr Jones might potentially miss the paramedics if they were to send them down the mine because there is more than one way in and out of the mine. A decision was made that the paramedics would stay on the surface.

When the paramedic made contact with Mr Jones he was in arrest with his co-workers carrying out CPR.

The ambulance took him to Wyong Hospital where he was declared deceased.

The Emergency Management System

The investigation examined the interaction between mine incident co-ordination of the crew members and surface personnel and the interaction between the mine and external emergency services. The Manager of Mining Engineering informed investigators about the mine's emergency management system and its performance on the day of the incident.

He also explained the interaction with mine staff and external emergency services and identified issues with the emergency management system. He provided information about the availability of appropriate rescue equipment and actions the mine took following the incident.

Cause of the incident

Nature of strata in West 6

SCT Operations assessed the geotechnical conditions in the West 6 Panel. An extract from the SCT report outlines the characterisation of the geotechnical properties experienced:

A characterisation of the geotechnical properties of the area being mined was possible through examination of the roadways, observation of the geology, geological structural features and trends. The behaviour of the formed roadways as a result of their development and as they have been impacted by the changing conditions brought about through extraction of the coal panel, demonstrate how well the formed roads and the installed support systems have been designed. These observations are collected through examination of the mine plans and designs and by detailed mapping of the roadways and coal seam exposures.

The seam being mined in West 6 was the Fassifern. A 3.10 metre thick interval was mined with the coal forming both the roof and floor to the working section.

The fallen slab causing the fatal injury, occurred when a section of southwest roadway rib fell as a large slab of coal and injured the coal miner. The slab involved in the incident was measured in detail and a mechanism for its failure determined.

A detailed map of the section of roadway where the incident occurred shows the dominant geological structural trend is jointing and faulting trending northwest to southeast and dipping vertically to dipping towards the northeast. Principle horizontal stress direction was indicated to trend to northeast to southwest. Abutment loading from the goafed section of West 6 Panel induces floor heave in advance up to 2 cut-through in advance of the face. Tension fractures were also noted in the rib side of chain pillars between 6 cut-through and 5 cut-through. Fretting and minor skin spall of the rib is noted mainly between 6 cut-through and 5 cut-through, becoming less abundant quickly outbye of 5 cut-through. Fretting was noted to be formed at both the top and base of the rib in places. Slabbing of the rib was formed in many areas throughout the panel, most commonly on intersection corners and the south-western rib.

The depth of overburden was about 200 metres and as such the anticipated vertical stress loading is approximately 5MPa. The in-situ horizontal stresses in the rock strata are typically much higher than the vertical stress. Within the area examined horizontal and vertical stress induced deformation was especially well developed adjacent mapped fault structures. These were intersected during development and were compiled onto the Chain Valley Colliery geotechnical plans. These were areas of minor roof dropout and rib spalling adjacent faults intersected by the roadways. Minor roof gutters were present which also indicate the effect of stress impacting the roadway during development.

Systems of work

The Manager of Mining Engineering described the pillar extraction management in West 6 Panel. He told investigators that before extraction began the panel was geotechnically mapped by a geotechnical consultant.

“That mapping is the basis of the mapping that’s recorded on the Authority to Mine (ATM) for that panel,” he said.

“From that mapping, (the consultant) recommended a secondary roof support regime to be installed and that secondary support regime for the roof is also recorded on the ATM.

“So the ATM will specify additional roof support to be installed. With regards to the ribs, when West 7 Panel was ready to extract a similar process was undertaken in West 7 Panel and (the consultant) recommended a regime of secondary roof support for that panel but also a regime of secondary rib support for that panel, which included a single 1.8 metre rib bolt to be installed at a metre spacing through, on the left hand side rib throughout the entire panel.

“At that stage we had discussion with (the consultant) over a period of several weeks to review the rib support regime for West 6 Panel on development with an aim to identify a rib support pattern that would be sufficient for secondary extraction that we could install on advance, to save the need for installing secondary rib support on retreat.

“A decision was made to change the rib support pattern in West 6 on advance, essentially to install a secondary rib support on advance. Now that occurred from approximately 14 cut through I believe in-bye for the remainder of the panel. The out-bye area of the panel, the secondary rib support regime that was recommended for West 7 was also recommended for that area that had been previously supported on the primary support pattern.”

When asked what took place to bring the rib support to the specified requirement he said “My understanding is that there was no additional secondary support installed out-bye 14 cut through in the ribs”.

“The Authority to Mine identifies the secondary support regime required and it was the responsibility of the, the mining supervisors, including the Deputies and Undermanagers and ultimately the Production Manager and myself to ensure that the secondary support regime was installed. Out-bye 14 cut through the primary support pattern installed was identical to the primary support pattern installed in-bye, all be the length of bolts was not the same.

“The support patterns out-bye identify the spacings to be at two metres. In practice the bolts are installed at one and a half metres which is the spacing for the roof modules. So in practice the out-bye of 14 cut through the rib support pattern was installed at one point five metre spacing’s, which was two rib bolt, two 1.2 metre rib bolts at 1.5 metre spacing. In-bye 14 cut through the secondary support pattern was two 1.8 metre rib bolts at 1.5 metre spacing so, the pattern and type of bolt were identical for both areas and visually they appeared the same.”

Strata Failure Management Plan

Coal Mines in NSW are required to create and implement a major hazard management plan for strata failure (the Strata Failure Management Plan). The relevant provision is provided:

Chain Valley Colliery has a Strata Failure Management Plan in which the operator outlines the requirement of the regulation, the operator’s management control and relevant documentation.

The investigation identified that the new plan had been created but had not been completely implemented. This was explained to investigators:

Following an audit and gap analysis a new Strata Failure Management Plan document was produced and approved for training on 17 November 2010, however, it was not in effect at the time of the incident as not all the workforce had been trained in the document.

As of 3 June 2011, approximately 90% of the workforce had been trained and assessed in the review of the new Strata Failure Major Hazard Management.

Pillar Extraction Management Plan

Chain Valley Colliery has a Pillar Extraction Management Plan for the extraction of Fassifern Seam West 6 Panel (CV-S&H-MP-017.3).

According to the plan, management of ribs in the pillar extraction area included:

- Systematic rib support may be erected in accordance with support plans prior to pillars being extracted in any row. After inspection extra supports may be erected where there are geological anomalies intersecting the workings
- All loose rib is to be scaled down prior to lifting commencing
- Should any deterioration occur in the ribs then extra rib support will be installed
- The unit deputy will carry out regular inspection of all the face area and wheeling roads, to determine the state of the ribs. Where required, they will bar down and make safe any loose rib material
- Chain Valley Colliery headings are driven sub parallel to major coal cleat direction—while ribs in the headings have been supported ribs parallel to the major cleat line pose the greatest risk, as there can be a greater chance of slabbing. If extra rib support is required due to extra weighting secondary rib support or scaling of ribs are required. When working near a pillar corner take extra care of the rib condition.
- A weekly unit audit will also be conducted, under the direction of the Deputy and the Undermanager. The audit will include as a minimum:
 - An inspection of the face conditions and the roadways for the next week's production, specifically roof, rib and floor conditions, to identify the hazards and implement controls to reduce any risk

West 6 Weekly Pillar Extraction Audit

The extraction of Fassifern Seam West 6 Panel required a weekly pillar extraction audit. This is shown in the following extract from the West 6 Pillar Extraction Management Plan.

It was identified by investigators that four strata audits had been completed by three separate deputies in West 6 Panel for the area where the slab fell on Mr Jones. The audits did not report any problems with the condition of the roof and/or ribs in West 6 Panel.

The Chain Valley Colliery Training and Competency Management Plan (TCMP) does not refer to the weekly audit document directly – it does refer to training of the Chain Valley Colliery hazard management plans. One deputy completed two pillar extraction weekly audits; he told investigators that he was not trained on the use of this document. Two more weekly audits of the incident area were completed on two separate occasions. There is no evidence of training records relating to the audit documents for those two deputies.

Audits and inspection by mine supervisors in West 6

One deputy demonstrated his attention to rib support by requesting that contractors install extra roof and rib support.

Another deputy demonstrated his attention to rib support on the night shift preceding the incident by using a machine to pull down a large rib slab.

One deputy had been contracted to the Chain Valley Colliery for four weeks.

He told investigators that to carry out his audit “you wander around the panel and fill it out as you go”. He said he was not given any instructions on how to conduct the audit.

“The (undermanagers) just gave it to me and said an audit requires doing.”

The document asks the user if the ribs are supported adequately.

“I put yes,” he said.

Another deputy stated that he completed two audits with little to no relevant training on the document itself. The West 6 Pillar Extraction Management System Plan clearly states that “the audit team, at a minimum, will include the Undermanager, Unit Deputy”.

It also appears that a third deputy completed the document without the support of an Undermanager.

Deputies’ awareness of rib issues in the panel was not reflected in the audit sheets. Three separate deputies on four occasions circled “yes” to rib support being in place in 5 to 6 cut-through B Heading. The audit sheets did not reflect the reality of the missing rib support.

The deputies audit sheets provided information to undermanagers that rib support in West 6 Panel was adequate. The emphasis of auditing appears to be reviewing secondary roof support.

The investigation also ascertained the level of understanding that two undermanagers had of the audit process. It appears neither undermanager was part of the audit team as per the West 6 Pillar Extraction Management Plan.

It is noted that the Mine Manager, Weekend Mine Undermanager and the day shift section Deputy all visited 5 to 6 cut-through in B Heading shortly before the incident. The non-conformance in the rib support was not identified on the inspection or measures taken to rectify the non-conformance.

Authority to mine

The Chain Valley Colliery Strata Failure Management Plan requires that each pillar extraction panel must have its own Pillar Extraction Management Plan as well as a Pillar Extraction Design Standard. It is this Pillar Extraction Design Standard that outlines the contents of the Authority to Mine.

The purpose of the authority system is to provide a framework for hazard assessment and control implementation for associated risks in a specified area of mining.

An authority for West 6 outbye of 6 cut-through was signed by three people - Manager of Mining Engineering, Production Manager and Technical Services Manager on 24 May 2011.

In the Pillar Extraction Design Standard geotechnical notes were to include secondary support requirements for roof and ribs and that the authority secondary support table identifies rib support as 1 x 1.8 metre 20 tonne cuttable bolt per metre for all left hand side ribs in the headings.

The West 6 Panel Extraction Design Standard states:

The forum for the development of a Chain Valley Colliery Authority to mine shall include where possible, but not be limited to:

- Production Manager
- Technical Services Manager
- Ventilation Officer
- Geotechnical Engineer
- Work Force Representative

Development of a Trigger Action Response Plan for strata failure

Trigger Action Response Plans (TARPs) are considered to be a significant control against indecision during a hazardous event. A TARP defines the minimum set of actions required during an event deviating from normality.

The TARP from night shift 2 June identified left hand side guttering in 6 to 7 cut-through B Heading and ticked no change in rib deformation. The TARP filled in on night shift 3 June ticked no change in rib deformation. On both these shifts the condition of the ribs has been assessed as "green" (okay). Also it should be noted that the strata monitoring results of night shift 3 June indicated no movement of any 'Clockits' and that the goaf was quiet.

There was no comment in any TARP audit sheet of issues relating to rib instability in West 6 Panel B Heading 5 to 6 cut-through.

Fassifern West 6 Secondary Support Rules

The investigation identified a plan in the crib room with some handwritten notes that provide indication of roof support for zones in B and F headings. The information was in addition to the Fassifern seam support plans for West 6 that stated:

Rib support 1.2 metre plastic bolt at 2 metre spacings 800 millimetres below the C parting in roadways that are within 20 degrees of the major cleat line (headings in West 6 and West 7).

Supervision on the shift of the incident

On the shift the incident occurred three mining officials attended West 6 Panel. Each mining supervisor spoke with Mr Jones at the face.

It is apparent that none of the supervisors identified and took action to correct the missing rib bolts in the incident area nor the missing rib bolts outbye at 5 cut-through. Production continued on day shift from the left hand pocket to the right hand pocket in the immediate vicinity of the unsupported section at the incident scene.

The Strata Failure Management Plan outlines the duties and responsibilities of the three supervisors that visited the panel on 3 June.

Development of safe standing zones at Chain Valley Mine

The Chain Valley Colliery Fassifern Seam – West Panels – Safe Standing Area Plans were created on 11 June 2010. The plans were created for the full extraction of coal and not the pocketing method as being used in West 6 at the time of the incident.

The zones were developed for either single sided lifting with two breaker line supports or double sided lifting with three breaker line supports.

The pillar extraction method in West 6 was different to that in the two safe standing area plans: Chain Valley Colliery was using double sided pocketing extraction with two breaker line supports.

The two documents were shown to mine management by investigators. It was identified that the plans were not specific to the system of work at the time of the incident. However, in review of the available plans, it was indicated that Mr Jones was standing in a “safe standing area” as highlighted in green. That is, it was safe to stand in the position *if all conditions of the managers support rules were sufficiently in place.*

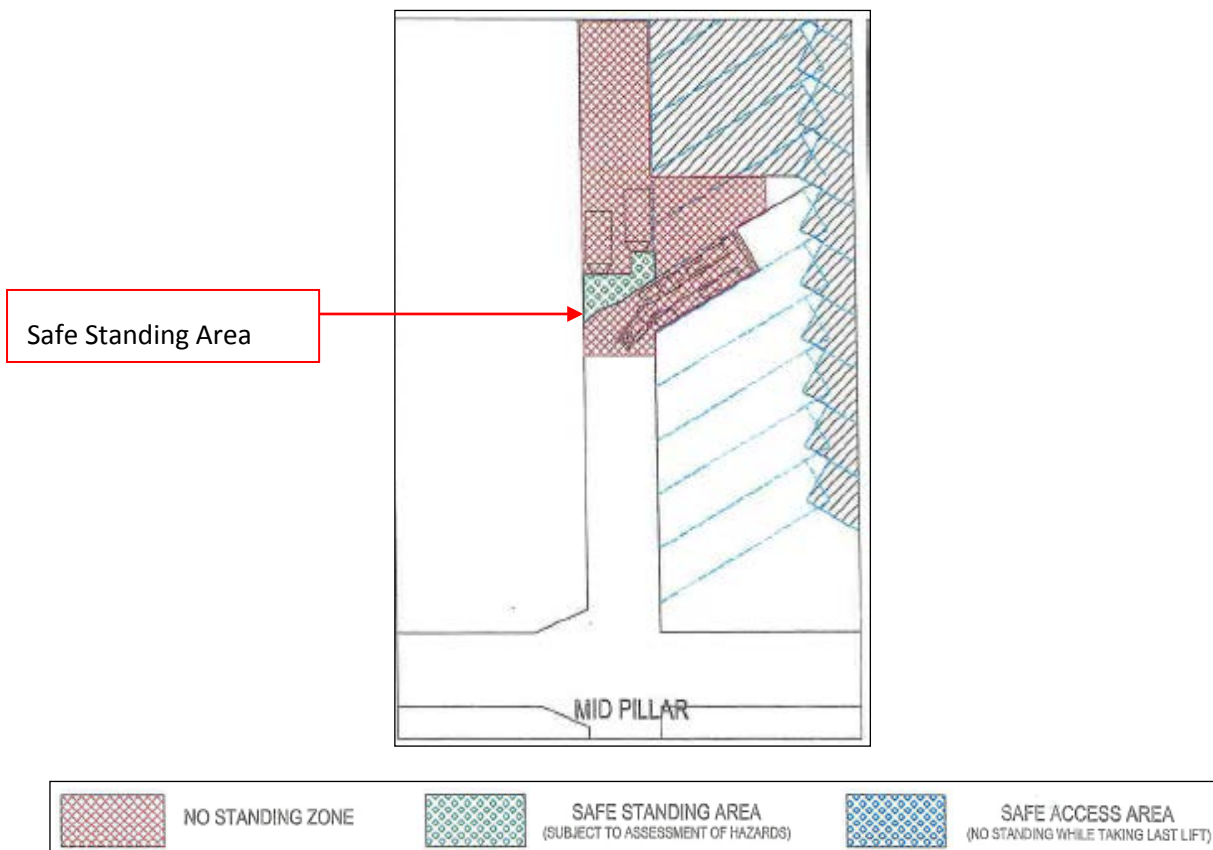


Figure 10 Extract of Fassifern Seam West Panels Safe Standing Areas Single Sided Lifting 11 June 2010

Occurrence of unsupported rib in West 6 outbye 6 cut-through

The investigation identified that there were multiple areas of unsupported rib that were inconsistent with the Managers Support Rules for West 6 Panel.

Chain Valley Colliery provided a map and a table of each rib spall or fall in West 6 panel B to F Headings from 1 to 7 cut-through.

Photographs 1 and 21 identify the unbolted section of rib at 5 cut-through B Heading West 6 Panel. It can be seen in Photograph 1 that the unsupported section as significant rib slabbing and appears ready to fall in similar circumstances to the slab that crushed Mr Jones. It also appears that a person had spray painted the words "CLOCK IT" on the rib side indicating that a clockit is to be installed in the roof.



Photograph 21 Looking inbye at 5 cut-through of the left hand rib noting that a significant distance of rib does not contain any rib bolts.



Photograph 22 Looking inbye in D Heading showing a large rib slab on the floor in the centre of the photo, which appears to have come from the removal of a rib slab on the night shift before the incident.



Photograph 23 Looking inbye in D Heading showing a large unsupported area of rib side in a shuttle car wheeling road.

SCT Operations reported on the areas of rib that were not bolted:

Mapping conducted by SCT focussed on recording the distribution of geotechnical condition and installed rib support present between 3 cut-through and 6 cut-through on all headings. Figure 3 shows the distribution and density of rib bolting within the panel together with the presence of rib slabbing, location of floor heave, presence of rib fretting and spall. Roof condition was noted to be very good and no change in roof condition was noted apart from the roof cavities and gutters noted in the Chain Valley Colliery Geotechnical Plan.

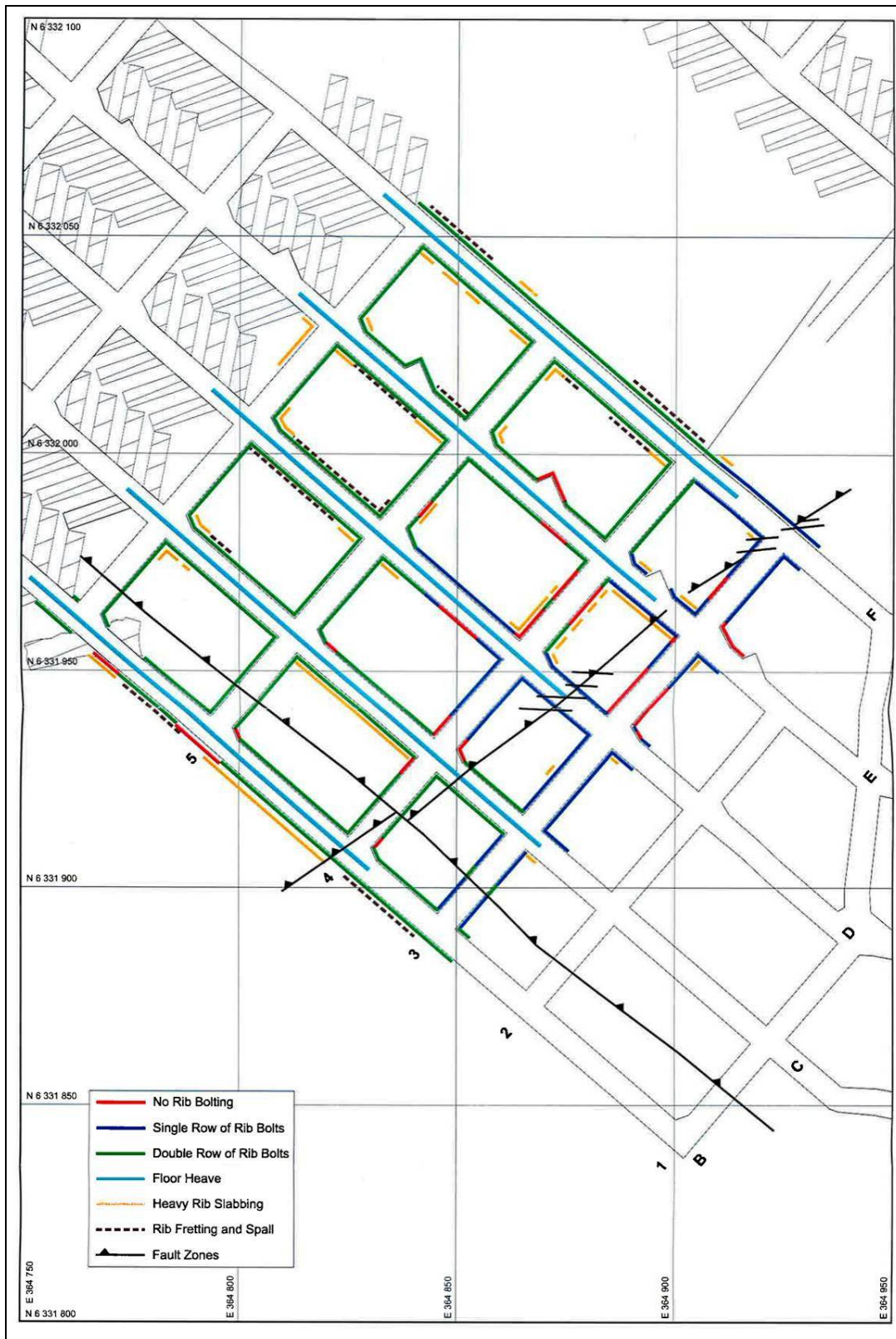


Figure 11 SCT Figure 3 Mine plan showing mapping undertaken by SCT Operations.

All headings in West 6 Panel (B–F) had significant levels of floor heave. This is mainly caused by abutment pressures experienced during pillar extraction. Rib bolting and strata failure presenting as rib spall are also mapped. Below is an extract from the report describing the West 6 installed support and rib failure rate:

4.3 Actual Installed Support

Mapping between 3 Cut-through and 6 Cut-through included recording the distribution and density of rib bolts. Three divisions of rib bolting within the inspected area were determined (Figure 3):

- 1 Green - where two rib bolts have been installed.
- 2 Blue - where a single rib bolt has been installed.
- 3 Red - where no rib bolts are installed.

Within the mapped area there are approximately 21 intervals which have no installed rib bolts Figure 11. Seven of these intervals also correspond with sections affected by heavy slabbing. This includes the interval of slab failure that struck Mr Jones.

There are 21 intervals that have no installed rib bolts between 3 cut-through and 6 cut-through. Of these 21 intervals seven correspond with heavy slabbing of the rib.

Investigators asked a manager to look at an audit document that noted that the ribs were “adequately supported” from 6 cut-through to 4 cut-through but when he was shown photographs of the incident area he said; “There is no support”.

Factors affecting rib stability

The SCT report stated:

The machine position when examined was within a 0.62 metre deep trench dug into the coal floor and the rear left corner of the machine was pressed up against the lip at the rear edge of this trench. Travel of the machine back and forth across a zone of soft floor caused by a floor heave had created this trench. While excavating the lift, slight impacts from the machine against the rear face of this trench appear to be the impetus that dislodged the slab, which was only supported by a thin 0.1 metre wide column of coal at its base.

Mapping showed similar rib slabbing areas present throughout the workings, especially on corners where additional boundary was added to the potential slab by the action of machine cutting. The primary mechanism for the formation of slabs is the presence of jointing. The section of slab most likely to fail was recognised to have wedge shaped bases caused by the intersection of a cross cutting and dipping joint set intersecting zones of vertical joints.

Other factors affecting roof and rib stability during active pillar extraction are identified in MDG 1005 *Manual on Pillar Extraction in NSW Underground Coal Mines*. In relation to the scenario at the time of the incident the following factors were considered and an explanatory commentary has been extracted from MDG 1005 to assist with a better understanding of the geotechnical issues.

[Further commentary and extract from MDG 1005.](#)

Undermanagers and deputies reports related to roof and rib bolting in West 6 Panel

On 12 April 2011 a deputy asked a contractor to install four rib bolts.

Records show that on 21 April 2011 day shift report by an undermanager before lifting in E Heading that there was a rib fall near the breaker line supports, which knocked the electrical cable off the hooks, wrapped around the head of the continuous miner and meant the cable had to be changed.

On 25 April 2011 an undermanager reported that the bolting rig was removed from the panel.

On 9 May 2011 an undermanager reported that rib bolts were taken out of the panel and taken to another panel.

On 3 June 2011 a deputy reported that shuttle car 45 was unable to move because of a rib fall. On that shift a large slab of rib coal was knocked down. The rib was not bolted following the removal of the slab of coal.

Role of the department before the incident

In August 1992 the department published a guideline *Manual on Pillar Extraction NSW Underground Coal Mines*. The manual provides the basis for achieving the objective of design, implementation and control of pillar extraction methods. Extracts from the manual are provided below.

3.3.3 Existing supports roof and rib

All existing pillar areas should have been supported, to some extent, during development. This support may have been considered adequate for first workings but support type and density need to be reassessed prior to pillar extraction commencing. During this re-assessment the reliability of existing support needs to be assessed to determine if:

1. it was adequate in the first instance
2. it is still functioning effectively
3. it is adequate for pillar extraction

5.2 Supervision

5.2.1 Inspection frequency

5.2.1.1 Deputies – Specified in regulations

5.2.1.2 Undermanagers – Recommended over a 24 hour period of continuous pillar extraction the operation be inspected at least once by an Undermanager

5.2.1.3 Manager, Deputy Manager and Undermanager in Charge – Inspection frequency consistent with provisions of regulation.

It is recommended at least one of these officials inspect every pillar extraction operation at least once every week.

6.2 Review of unplanned incidents

These are unexpected incidents that occur when extraction is taking place within the parameters of the approved plan. Examples of such events are, 1. Buried continuous miners, 2. Excessive or unusual floor heave, 3. Creation of a feather edge 4. Excessive or unusual rib crush 5. Serious injury to a workman.

On 23 December 2006 the CMHSA 2002 and the CMHSR 2006 came into force. Section 32 of the CMHSA 2002 requires an operator of a coal operation to prescribe a hazard to people as a major hazard. Clause 28 (b) (ii) of the CMHSR 2006 prescribes as a major hazard for the purpose of section 32 of the CMHSA 2002 as being hazards arising from strata failure. Clause 32 of the CMHSR 2006 provides contents of a major hazard management plan: strata failure management plan. The contents of a major hazard management plan are (a) to state how the health and safety of the people who work at or are affected by the coal operation will be protected from the major hazard, and (b) to make provision for the matters prescribed by the regulations.

Post-incident actions of Chain Valley Colliery

The mine operator decided to cease immediately and permanently pillar extraction in West 6 Panel and to cease place change method of mining.

Post-incident actions of the department

Initial incident response

NSW Police officers attended the scene and provided a preliminary investigation into the cause and circumstances of the incident.

The department inspector attended the scene on 3 June. A section 89 Investigation Notice (OHSA) requiring the mine to take measures to prevent disturbance of any plant, substance or thing in the area specified was issued. Meetings were held with mine management and NSW Police. A section 62 obtain information, documents and evidence notice, a section 93 Prohibition notice to cease mining and a section 91 Improvement notice to assemble relevant information for review by the department were also issued.

Investigation

The matter was deemed to be a level three investigation undertaken by the Investigation Unit. Investigation Unit officers attended the scene on 4 June.

Functional Testing of continuous miner 2096 and remote

Both the continuous miner and the remote control unit were tested and no faults were detected.

Communication with family members

Communication was established and maintained between Mr Jones's family and the Investigation Unit.

Revocation of approval for extraction of coal

On 10 June the Director of Mine Safety Operations revoked Chain Valley Colliery's clause 88 approval for the extraction of coal in Domain No 2 by pillar extraction. LakeCoal Pty Ltd responded to the department advising that the mine operator was going to abandon pillar extraction in the Fassifern seam. The mine intended to extract coal using a new system called mini longwall.

Other notices issued on Chain Valley Colliery by the department

On the 17 and 21 June a Government Officials advice associated with the operation of the continuous miner number 2096 associated with the incident was issued.

On 4 July a Clause 51 prohibition notice related to secondary extraction roadway height in excess of the approved maximum height at 6 cut-through West 6 C to D Heading due to excessive floor cutting was issued.

Safety Alert SA11-08 Fall of rib results in fatality

The Chief Inspector of Mines issued a Safety Alert (SA11-08) dated July 2011. The recommendations were:

Operators of underground coal mines should review the existing assessment of the stability of coal ribs at the mine as required by clause 32 of the *Coal Mine Health and Safety Regulation 2006* and ensure support measures are provided, so far as reasonably practicable, to protect the people who work at the mine.

The recommendations of the Safety Alert target industry reviewing assessment of the stability of coal ribs at the mine as required by legislation.

Current status of crush injury management, training and information available to the NSW mining industry

The investigation contacted Coal Services and Mines Rescue to identify the status of crush injury management, training and information available to the NSW mining industry. NSW Mines Rescue identified that specific industry-based training package to deal with crush injury management could be initiated.

Findings

1. The location of the incident involving Peter Jones was adjacent to the first left hand pocket in B Heading 5 to 6 cut-through West 6 Panel (Fassifern Seam) Chain Valley Colliery.
2. At 1.55pm Mr Jones was struck by a falling 4.8 metre long slab of rib coal. The piece of coal weighing approximately 3.18 tonne, broke into two pieces when it hit the mine floor. Mr Jones was pinned by a 2.3 metre long piece weighing about 1.3 tonnes.
3. The crew members recovered Mr Jones from under the piece of rib coal within approximately eight minutes.
4. The 4.8 metre length of rib coal that fell contained no rib support bolts. Geotechnical consultants engaged by the department stated:

It was observed that the slab which fell on Mr Peter Jones did not contain any rib bolts as were observed inbye and outbye of the fallen section of rib. The fallen slab was wedged shaped and had very weak natural support as it was bounded by several planes of separation. A very thin column of coal at the base of the slab was the only material supporting the weight of the slab in place. The final impetus to this slab toppling over by gravity was considered to be induced vibrations from the movements of the machine operated by Mr Jones.

5. At the time of the incident Mr Jones was within an area considered to be a safe standing area as per the Safe Standing Areas Plan– the criteria being that the rib was supported as per the signed “Authority to Mine” approved plan.
6. The crew relied on ad hoc equipment to recover Mr Jones. A conveyor belt clamp and a 20 litre oil drum were used to free Mr Jones from underneath the rib spall. There was no fit for purpose rescue and recovery equipment located within the extraction panel to assist the crew in recovering Mr Jones from the incident site.
7. Mr Jones was transported from West 6 Panel using an underground mine vehicle to the drift dolly car for transport to the surface. During the journey in the drift dolly car Mr Jones’s condition deteriorated and he received CPR from mine workers.
8. At 2pm the Ambulance service of NSW responded to a phone call from Chain Valley Colliery. At 2.04pm dispatch code activated ambulance service to the mine. At 2.08pm the NSW Police Force was notified of the incident. At 2.11pm the first ambulance paramedic arrived at surface pit top. Further ambulance paramedics arrived at surface pit top at 2.18pm.
9. Senior Mine Managers had a conversation concerning the available information they had received from the crew in West 6 Panel. The information from underground was that Mr Jones had been recovered from the rib crush and had lower body injuries but was okay, and was being transported from the panel. A decision was taken for the main drift dolly car to remain at pit bottom and for NSW Ambulance paramedics to remain on the surface of the mine. The decision

considered the potential for the paramedics to miss Mr Jones's transport vehicle if the paramedics travelled down the second mine drift to pit bottom.

10. At 2.44pm a paramedic had first contact with Mr Jones when the drift dolly car reached the surface of the mine. Ambulance records indicate Mr Jones' condition as Code 2 (In arrest) with CPR in progress. Mr Jones left the mine in an ambulance at 2.49pm.
11. Mr Jones was transported to Wyong Base hospital arriving at 2.57pm for triage. At 3pm Mr Jones was taken off the ambulance stretcher. Mr Jones was pronounced deceased at 3.11pm.
12. The autopsy identified the direct cause of death of Mr Jones to be multiple injuries.

The pathology summary identified Mr Jones to have sustained soft tissue injuries to the trunk and legs. Internally Mr Jones had severe pelvic injuries and chest injuries including rib fractures and traumatic haemopericardium resulting from a lacerated pulmonary vein. It was identified that the overall pattern of injuries was consistent with a crush injury and that the pattern of injuries was non-survivable, even with immediate medical attention and would have rapidly and inevitably been fatal.

13. Why the rib side in the incident area was not bolted was attributable to the Pillar Extraction Management Plan and supervision by statutory supervisory staff to identify and correct the non-conformance:
 - a. The Pillar Extraction Fassifern Seam West 6 Panel Management System Plan did not identify and correct non-conformance of unsupported rib.
 - b. Four records of weekly pillar extraction audit were created by three Statutory Deputies.
 - c. Three records of weekly pillar extraction audit were counter-signed by two Statutory Undermanagers.
 - d. The West 6 Authority to Mine Plan was signed by senior mine management to extract coal when the support requirements relating to rib support were assumed to have been completed by secondary support contractors.

14. Post incident functional testing was conducted by the original equipment manufacturer and observed by an Inspector of Mechanical Engineering. The inspector reported that:

The remote control (Plant 1594) and the Dash 3 miner operated as per designed with no faults identified. I observed the above testing with no faults observed. All functions operated as designed. Chain Valley Colliery, the original equipment manufacturer and I agree the miner is safe to operate.

15. It was identified that crew members had a basic understanding of crush injury management. However, issues were identified regarding the lack of appropriate equipment available to the crew for ongoing management of a crush injury.

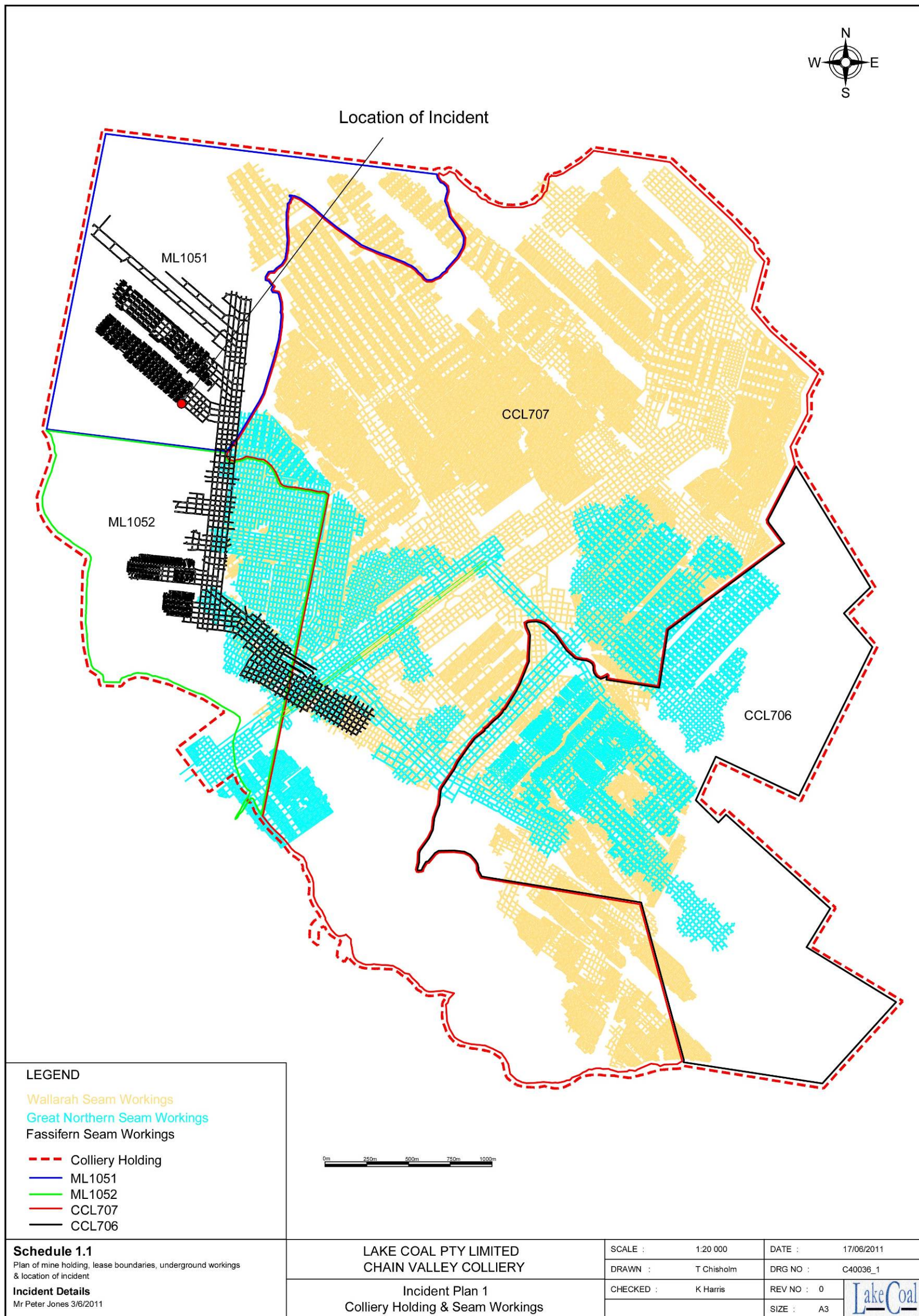
Information concerning the status of training and competency within the NSW mining industry relating to crush injury management was obtained from an industry training organisation CSPL– NSW Mines Rescue Pty Ltd:

- a. No specific rescue response resources are provided by CSPL for the purpose of crush injury.
- b. No specific training and competency programs are provided by CSPL concerning crush injury management.
- c. At present no specific training course is available for management of crush injury. General awareness is contained in most industry first aid training or trauma management training.

NSW Mines Rescue has recommended that emergency response agencies including NSW Mines Rescue, Ambulance service of NSW and Australian Resuscitation Council develop a specific industry-based training package.

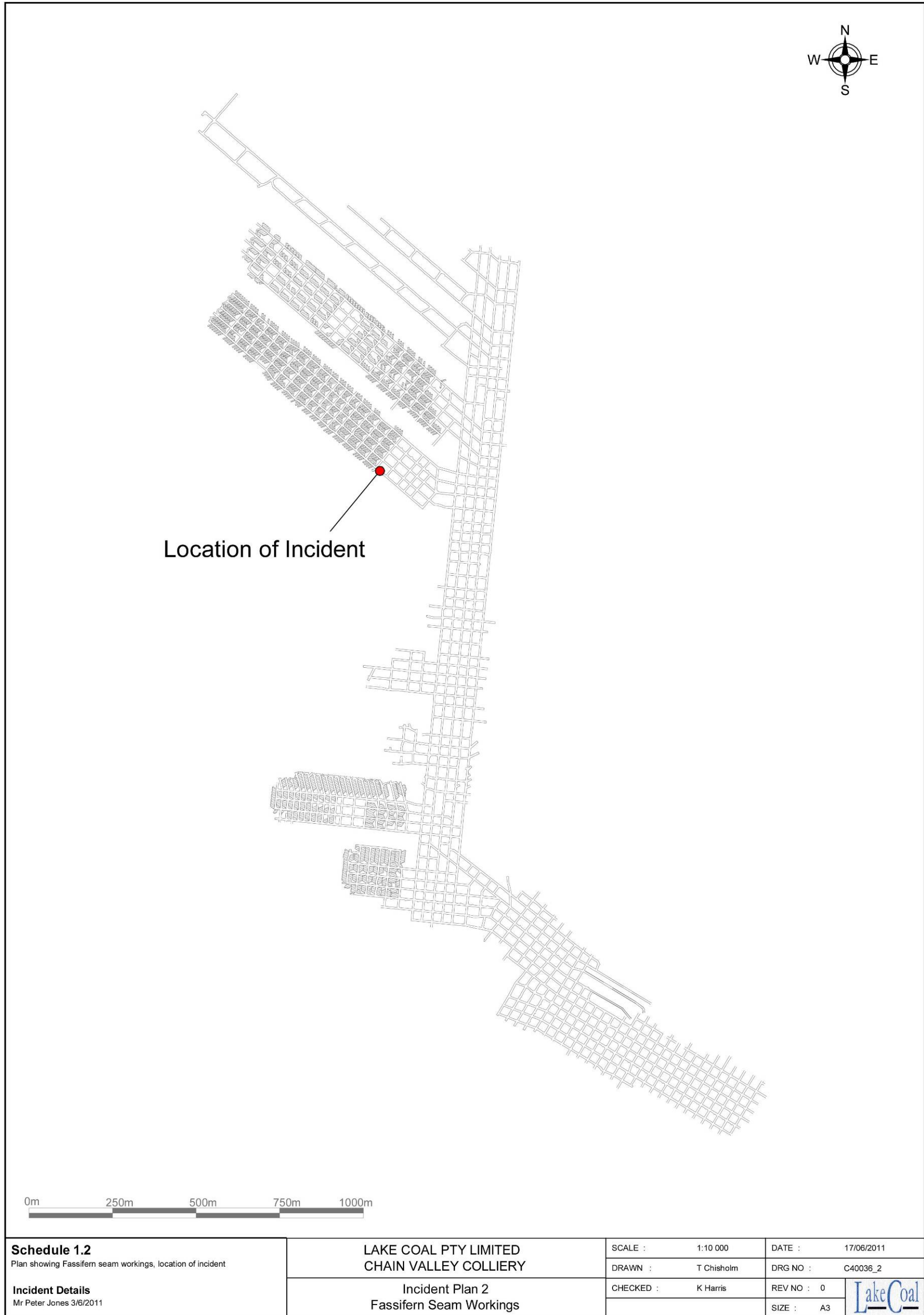
Attachment 1

Incident Plan 1 Colliery Holding and Seam Workings (Plan Number C40036_1)



Attachment 2

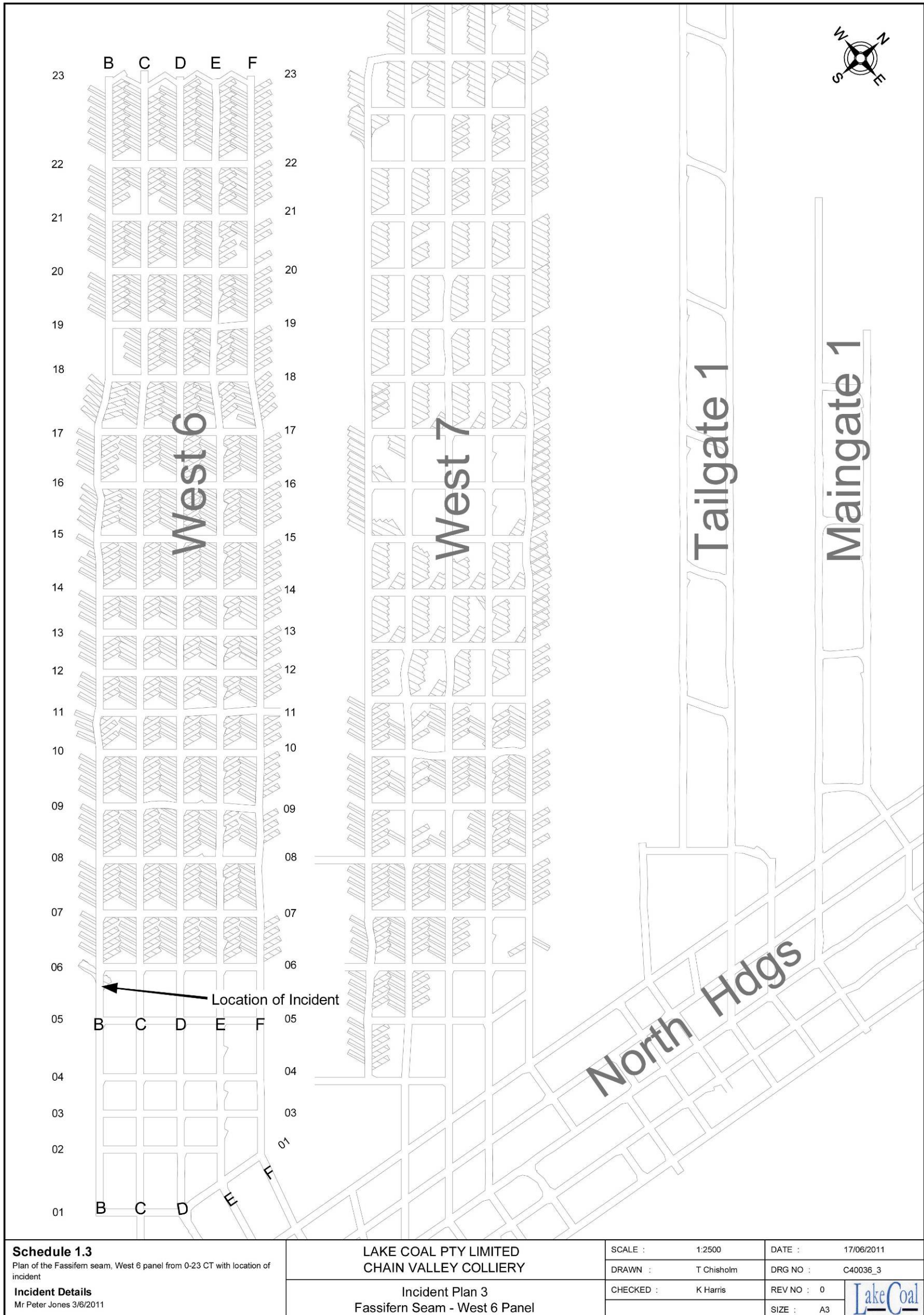
Incident Plan 2 Fassifern Seam Workings (Plan Number C40036_2)



Schedule 1.2 Plan showing Fassifern seam workings, location of incident	LAKE COAL PTY LIMITED CHAIN VALLEY COLLIERY	SCALE : 1:10 000	DATE : 17/06/2011
	Incident Details Mr Peter Jones 3/6/2011	Incident Plan 2 Fassifern Seam Workings	DRAWN : T Chisholm
		CHECKED : K Harris	REV NO : 0
			SIZE : A3

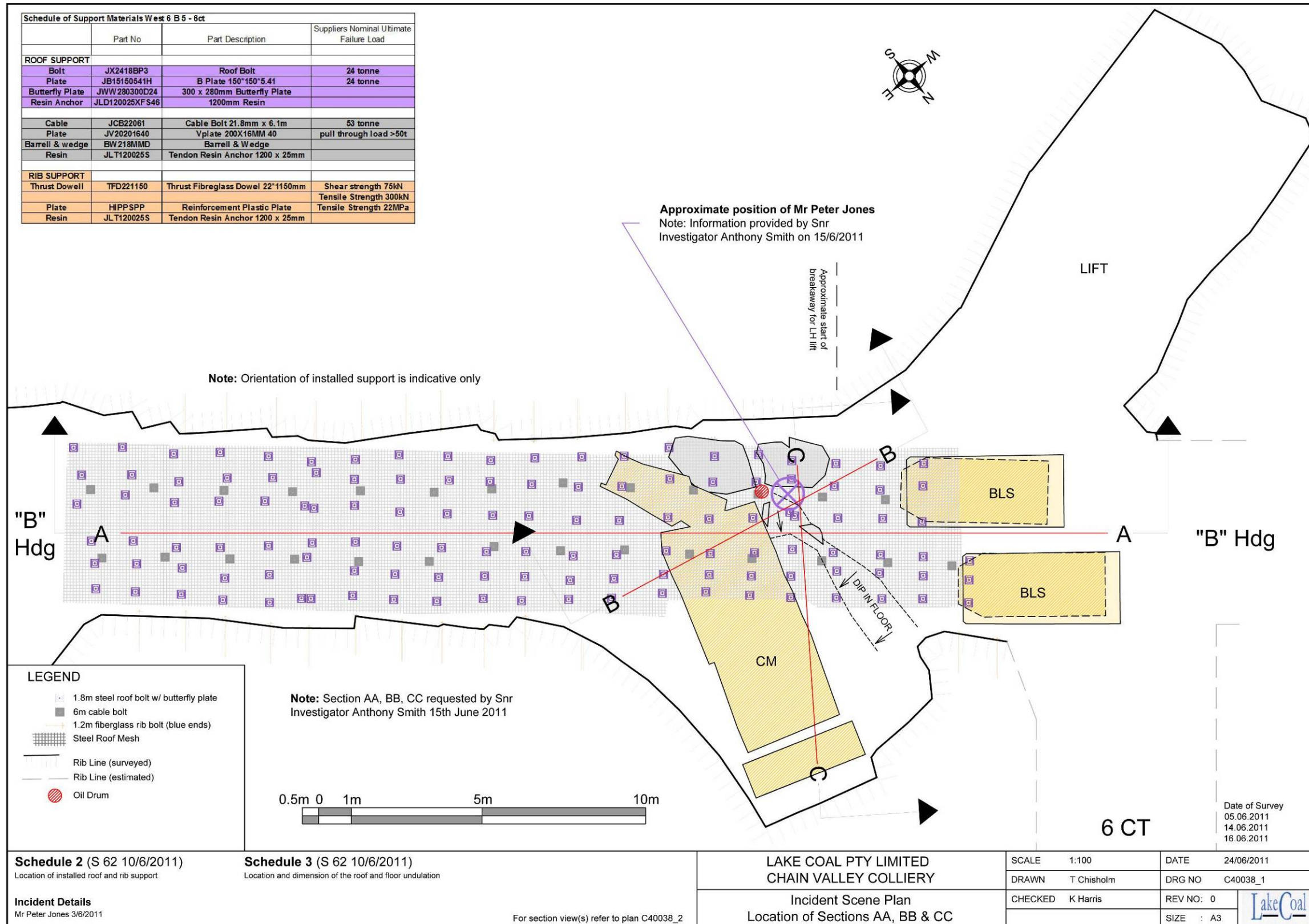
Attachment 3

Incident Plan 3 Fassifern Seam – West 6 Panel (Plan Number C40036_3)



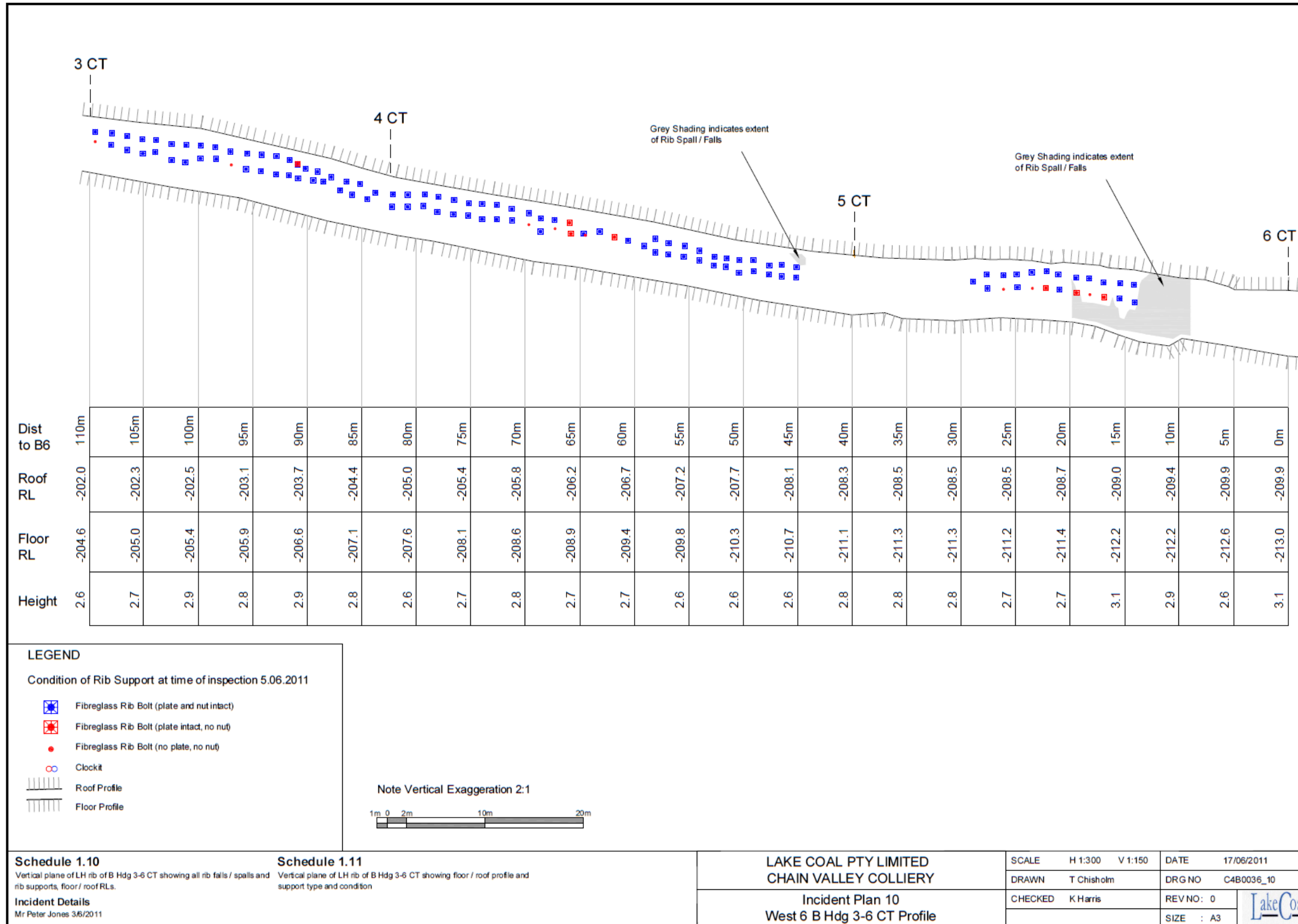
Attachment 4

Incident Scene Plan Location of Sections AA, BB, CC (Plan Number C40038_1)



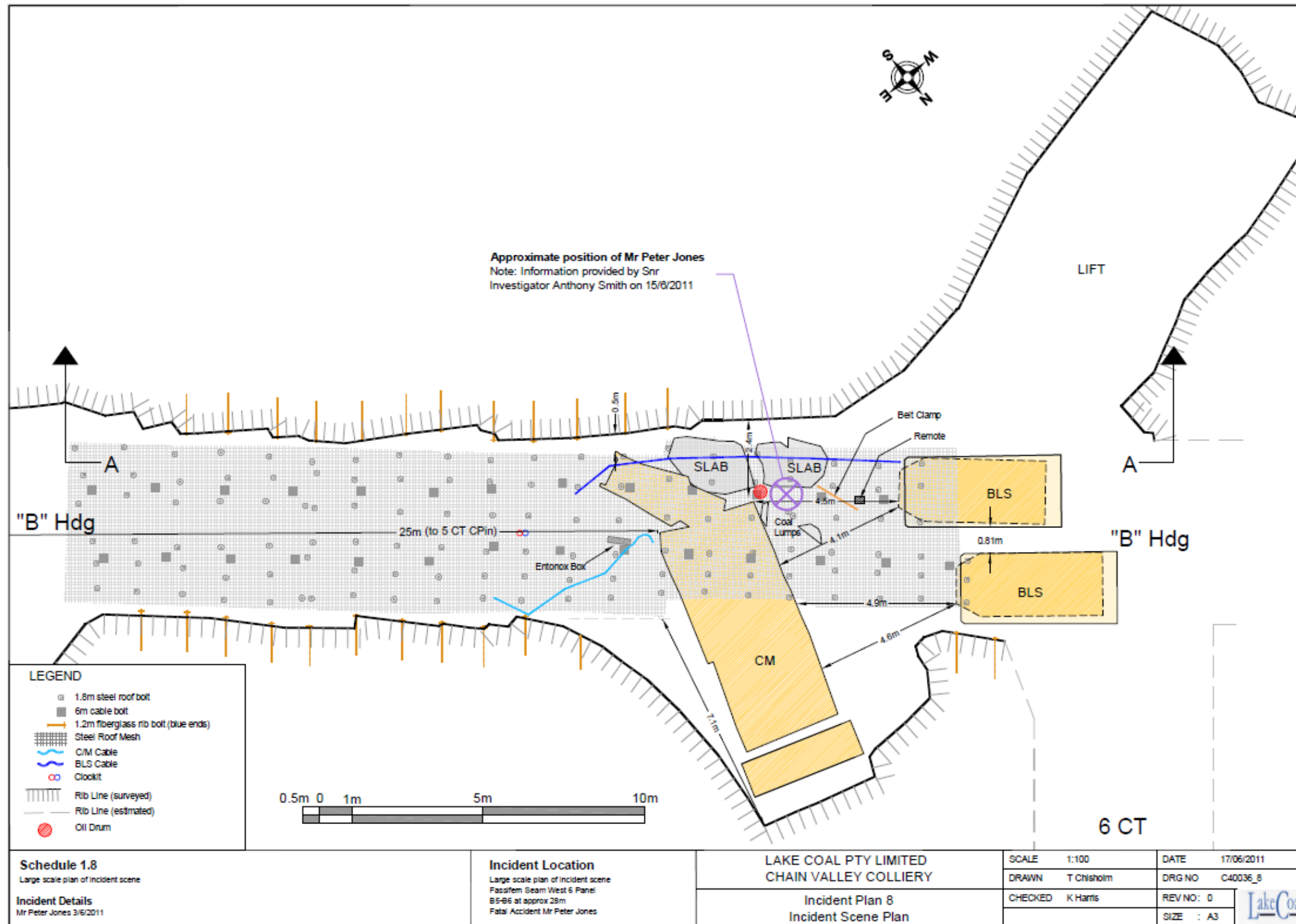
Attachment 5

Incident Plan 10 West 6 Hdg 3-6CT Profile (Plan Number C4B0036_10)



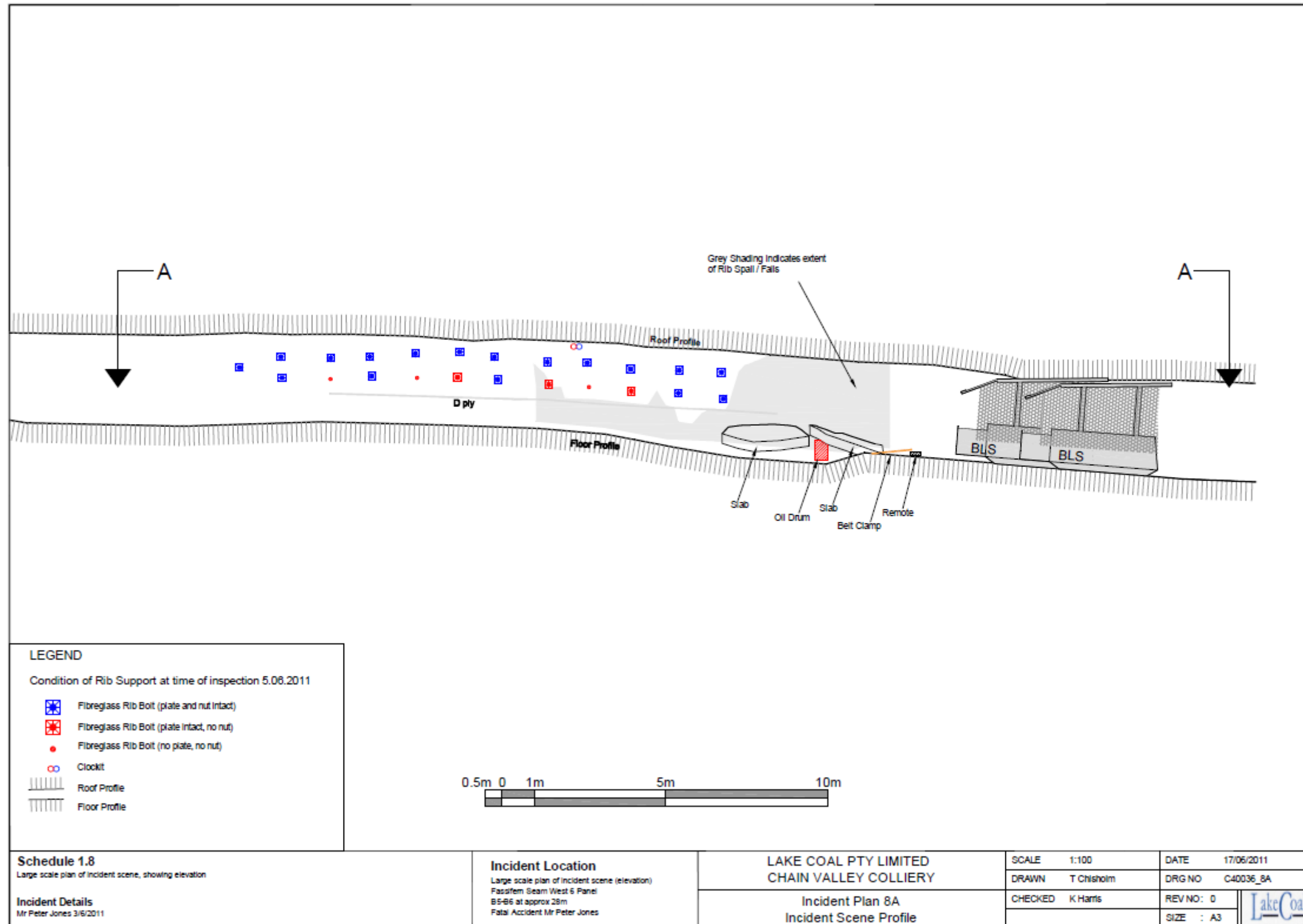
Attachment 6

Incident Plan 8 Incident Scene Plan (Plan Number C40036_8)



Attachment 7

Incident Plan 8A Incident Scene Profile (Plan Number C40036_8A)



Attachment 8

Incident Plan 7 West 6 Completed Mining Sequence (Plan Number C40036_7)

