

## 1. EXECUTIVE SUMMARY

At 8.30am on the 12 April 2002, Mr Christopher James Belfield, a term contract employee of Ergon Energy Corporation Limited, working at the BMA Blackwater Mine sustained fatal injuries when the jib of a vehicle loading crane (VLC) that he was operating at the time, struck him in the back and crushed him against the control panel.

Mr Belfield was a member of a team of four Ergon Energy employees, who on the day of the accident had their first task at the mine cancelled due to the unavailability of some transformer fittings. As a result, Mr Belfield and another team member were directed to return to the Ergon Energy lay down area located beside the back access road of the mine and remove all the materials and module from the tray of the Mitsubishi FK 457 truck. This was in preparation for the next task of loading conductor wire at another part of the mine. The Mitsubishi FK 457 truck had a HMF 622-K2-B2 vehicle loading crane fitted to the rear and was assigned to Mr Belfield to operate.

After unloading a bed log from the tray of the truck, it appears, due to the absence of any contrary evidence, that Mr Belfield inadvertently operated the jib raise/lower control lever in a downward direction causing the jib of the vehicle loading crane to close, striking him in the back and crushing him against the controls that he was operating. As a result of Mr Belfield being forced into the control panel, the control levers on the opposite side of the truck could not be operated to release him. The other team members used another truck fitted with a slewing crane to winch the jib off Mr Belfield and remove him from the control panel. They then activated the emergency procedures.

Both the mine and town emergency services quickly responded. CPR was administered as soon as Mr Belfield was released and continued while being transported to the Blackwater Hospital where he was pronounced dead on arrival. The Blackwater doctor and Police followed the ambulance to the hospital.

The investigation into the nature and cause of the accident has identified the primary cause of the fatality as the inadvertent operation of the jib control lever by Mr Belfield. The reason for this action by Mr Belfield could not be determined as there was no eyewitness to his actions at the precise time of the accident. Three possible scenarios have been described in this report but as there was no conclusive evidence to support one scenario more than another, any of them could have been the cause.

Contributing factors were:

- a) Failure to identify the hazards associated with the operations of the vehicle loading crane by using risk management techniques.
- b) Inadequate training and assessment of the operators of the vehicle loading crane.
- c) Inadequacy in the design of the vehicle loading crane in that the crane could be slewed within the area of the operator's control panel.

The report outlines further findings that identify system deficiencies at the mine and within Ergon Energy.

From the investigation into the accident, several breaches of the coal mining legislation were found. These are covered in detail in section 6.5 of this report.

In the operation of a vehicle loading crane, the hazard and subsequent practice that caused this fatality has been present but not identified by the mining industry, other industries and manufacturers of the equipment for a period of time. Training materials and manufacturers manuals do not adequately address the hazard.

**RECOMMENDATIONS:**

It is hereby recommended that :-

1. Risk assessments should be carried out on the operations of all vehicle loading cranes used in the industry and appropriate controls should be put in place to ensure the operator is not exposed to an unacceptable level of risk. Included in the risk assessment should be the:
  - a) Design features of the vehicle loading crane including:
    - Guarding of the control levers;
    - Location of the control levers;
    - Slew of the crane within the area of the control levers;
    - Direction of the control lever movements for each function;
    - Labelling of the functions;
    - Ability to release hydraulic pressure in the case of an emergency.
  - b) Configuration of the crane on the vehicle, with special attention given to:
    - The use of the vehicle and vehicle loading crane;
    - The location of the crane slew end points;
    - The vision of the operator;
    - The location of the operator when folding/unfolding the crane;
    - The confinement of the operator's work area at the control levers.
  - c) Operational activities.
2. Training and Assessment packages for the operation of vehicle loading cranes within the industry should be reviewed to ensure the hazards of operation are identified and addressed. As part of the review, particular reference should be made to the General Requirements of the Australian Standard AS 2550.1 Cranes – Safe Use, which addresses the operational hazards associated with this accident. Critical aspects to be considered should be:
  - The implementation of 'no-go' zones around the operator's control panel where the crane should not be operated or slewed into;
  - The description of these 'no-go' areas including the use of drawings, photographs and videos;
  - The importance of watching the crane hook when operating crane;
  - The importance of not working under the boom of the crane;
  - Daily inspections of the equipment;
  - Recording of the inspections and any defects found, in a Log book.
3. Manufacturers that supply vehicle loading cranes to the industry should be informed of this accident and the outcomes of the investigation so that engineering design changes can be made to ensure:
  - That a crane cannot be slewed into the operator's working area at the controls;
  - That the operations of the control levers for similar functions are the same;
  - That to lower the boom or jib should require the control lever to be moved upwards;

- That the location of the control levers allows a person to operate the crane in safety with clear vision of the operations;
  - That the control levers are guarded or shrouded to prevent accidental operation;
  - That the geometry and configuration of the jib ram or hydraulic circuit to this function is modified to remove the acceleration of the jib when it passes the centre of the pivot between the jib and boom.
  - That deadman controls are incorporated that will stop all operations in the event of an accident or absence of the operator from the controls.
4. Instruction manuals and training material should not display drawings and photographs that encourage unwanted practices and risk to the operator. Appendix 22
  5. Contractors and Suppliers to the industry who operate vehicle loading cranes on mine sites, should be made aware of this accident and the outcomes of the investigation so that the equipment and operation of the equipment meet the standard required by industry.
  6. Department of Employment and Training, Division of Workplace, Health and Safety should be informed of the accident and the recommendations so that they can take similar actions with other industries.
  7. The Chief Inspector of Coal Mines should convene a Review Committee as allowed for in the Compliance Policy to determine the appropriate action/s to be initiated in response to the legislative non-compliance issues as detailed in Section 6.5 of this report.
  8. BMA Blackwater Mine should conduct a review of the Contractor Management Procedure with special consideration given to the following issues:-
    - a. Training and Authorisation of contractors in compliance with the legislation.
    - b. Use of the correct forms eg BMA CONTRACTOR EMPLOYEE AUTHORISATION QC-FSAF005.
    - c. Audit content and competency of the people conducting audits.
    - d. Compliance with procedures by contractors eg in this incident, use of the Vehicle Usage Log and Inspection Records by Ergon Energy employees.
  9. Open cut coal mining operations should review their Emergency Response Plans to ensure:-
    - a. An emergency signal initiated following an incident, can be received by all personnel using two-way communications.
    - b. The emergency signal does not impede further communications on the two-way system.
    - c. In the event of an emergency that traffic on mine roads, stops and allows a clear travel way to all emergency vehicles.

### 3.2 MINE LEASES AND TENURE

The current mine leases for Blackwater Mine are 1759, 1760, 1761, 1762, 1767, 1771, 1772, 1773, 1792, 1800, 1812, 1829, 1860, 1862, 1907, 70103, 70104, 70091 and MLA 70139 (South Marshmead) and 7167 (Humboldt).

### 3.3 MINING OPERATIONS

#### 3.3.1 The Mine Integration Project

Blackwater Mine comprises the previously separate South Blackwater and Blackwater mines in a single operation. A joint venture partnership between BHP Australia, Billiton and Mitsubishi Japan, known as the BHP Billiton-Mitsubishi Alliance (BMA) Coal Operations Pty Ltd owns and operates the mine. BMA are planning a run a mine production of up to 14 million tonnes per annum from the integrated operation. Considerable work has been done in optimising mining strategies, use of existing facilities, equipment and resources however the overall magnitude of environmental impact and scale of operations will not significantly change from that which existed previously.

The integration will include a consolidation of the industrial areas to a new location on ML 1762. This facility is scheduled for completion in mid 2002 and will include the following facilities:

- administration and training facilities,
- bulk storage facilities for diesel, ULP, LPG and lubricants,
- a sewage treatment plant,
- a motor vehicle workshop area which includes a heavy vehicle workshop, service bays, fabrication bay, electrical maintenance bay, tyre change area, stores and office accommodation,
- a regulated waste storage area and,
- a water treatment plant which will draw from a raw water line.

The existing coal preparation plants in the previous South Blackwater and Blackwater industrial areas will be retained as will associated infrastructure such as sewage treatment, fuel storages, conveyor systems and workshops.

#### 3.3.2 Mining

Four major seams are mined at Blackwater Mine (Aries, Castor, Pollox, Orion). These are the top, middle or lower seams of the Rangal Coal Measures and produce a variety of coal products across the full mine area. Overburden depth varies from 15 to 80 metres with interburden ranging between 3 and 30 metres.

The general opencut mining method commences with the clearing of vegetation and stripping of topsoil to depths recommended in soils and suitability surveys. Topsoil is either replaced directly over regraded spoil or stockpiled for future use. Overburden is blasted and removed by a combination of truck and shovel, draglines and dozers which relocate spoil to previously mined out strips or out of pit dumps. The truck and shovel operations normally remove the upper overburden layers from selected areas which is then placed over dragline spoil in pre-determined landform configurations. A considerable bulk of rehabilitation earthwork is achieved in this manner. Draglines and dozers uncover the coal which is drilled, blasted and hauled to one of two coal preparation plants or the Thermal Coal Plant.

### 3.3.3 Underground Operations

Underground mining has included a bord and pillar operation at Laleham, and a longwall at Kenmare, both mines having formed part of the South Blackwater operations. The Laleham underground ceased production 28 February 2001 and the mine was sealed 10 April 2001. The Kenmare 1 longwall operation was sealed in April 2001 and the Kenmare 2 underground closed in April 2002.

### 3.3.4 Mine Safety Performance

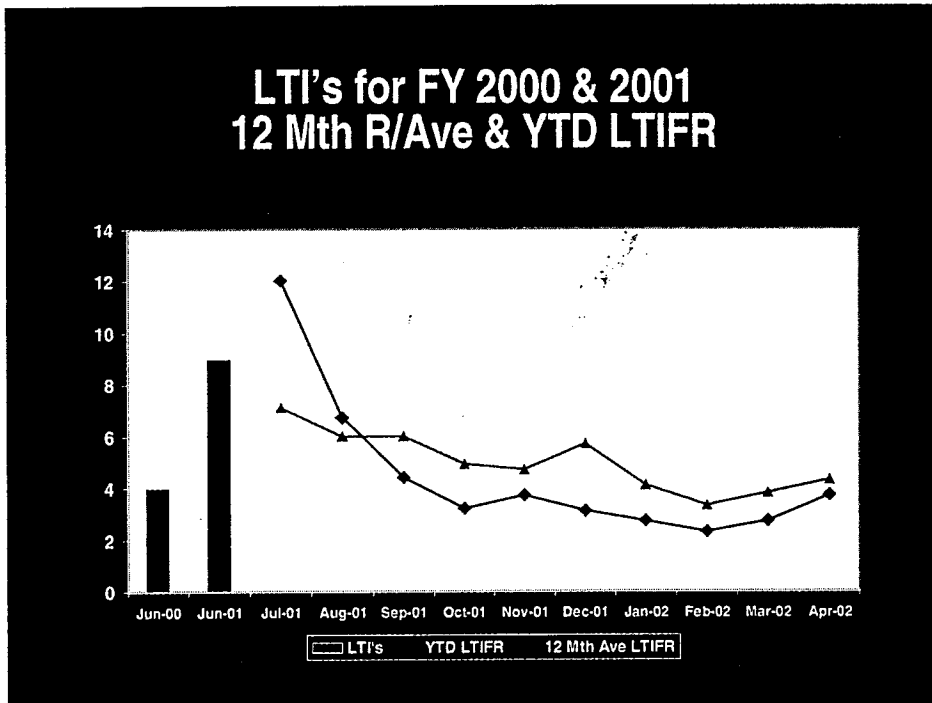
BMA Blackwater Mine has been through a period of significant change with the merger of the South Blackwater Mine and the BHP Blackwater Mine. The merger required integration of the two work forces, equipment fleets and utilisation of the Coal Preparation plants. The resulting Mine now incorporates over 60 kms of mining pits, three preparation plant areas, a new Industrial and Administrative area facility. The workforce now numbers approximately 600 full time employees with an average of 300 contractors.

The integration process required employees from the open cut operations at the South Blackwater Mine and the underground operations at Laleham and Kenmare mines, to be transferred to the Blackwater Mine workforce. Significant training of these employees was undertaken prior to them being introduced into the open cut environment and continues with the last group of personnel coming from Kenmare. Behaviour and Standards were also targeted to ensure that all employees understood and encompassed a mindset of one Mine, common standards and a required level of behaviour.

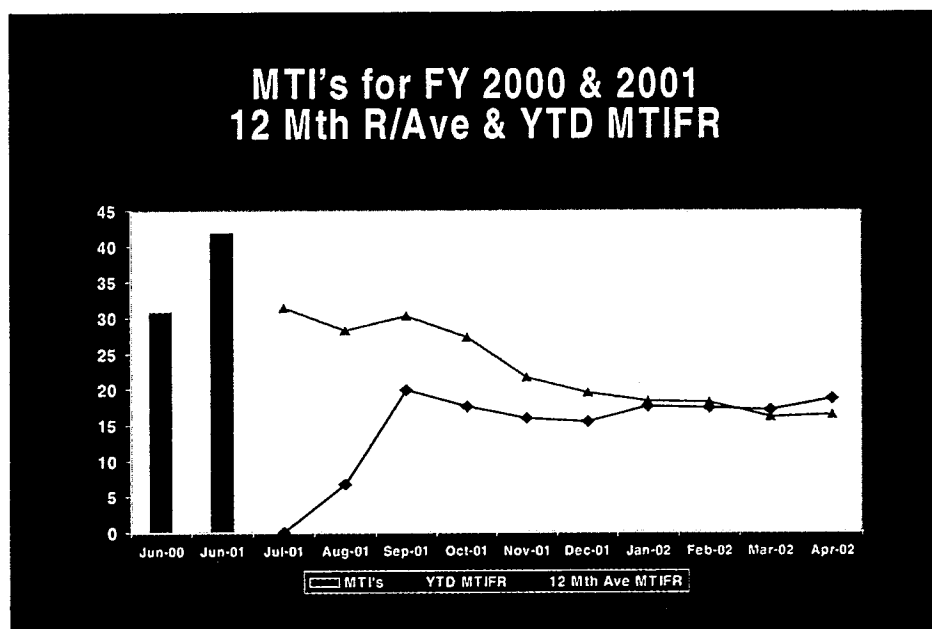
The new Industrial facility underwent extensive risk assessment processes prior and during construction. Although not completed, the safety performance for this project has been extremely high with no Lost Time Injuries or Medical Treatment Injuries being recorded.

The BMA Safety Management Plan (Coalsafe) was used as the basis for the Blackwater Mine Safety Management System (BSAFE) which incorporates 21 Standards targeting all areas of Safety, Health, Environment and Community. The Blackwater Mine Safety & Health Improvement Plan reflects the requirements of the Safety Management System and has then been used as the focus for the individual Department Safety & Health Improvement Plans. These plans direct the action of the Departments in achieving the required goals of the overall site standards. Extensive work has been undertaken at a Mine level to address all requirements of the new Coal Mining Safety and Health Act 1999 and Regulation. Each Department has identified the principle risks relating to their areas and implemented a comprehensive Risk Register and Principle Hazard Management Plan. These Department documents have been combined and form the Blackwater Mine plan. The Department of Natural Resources and Mines conducted an audit of the Safety Management System during February of this year and reported satisfactory compliance with legislative requirements.

The Lost Time Injury Frequency Rate (LTIFR) at BMA Blackwater Mine has shown a steady decrease over the past year. The 12 Month Rolling Average LTI FR in April 2002 was sitting at 4.3. This is compared to April 2001 of 8.7. These figures represent a total of 6 Lost Time Injuries (LTIs) this financial year compared to 10 LTIs last financial year.



The Medical Treatment Injury Frequency Rate has had a greater decrease over the past 12 months. This is reflected in the 12 Month Rolling Average MTI Frequency Rate which has fallen from 32.8 in June 2001 to 16.4 in April 2002.



## 4. NOTIFICATION

Mr Michael Madden, Site Senior Executive of the Blackwater Mine, reported to Mr Ken Cooper, Inspector of Mines – Central Region, at 9.14am on Friday 12 April 2002, that an Ergon Energy employee had sustained fatal injuries by crushing himself up against a truck with a Hiab crane while unloading gear from the truck. Mr Madden informed Mr Cooper that the police were the next to be notified. (Appendix 29)

At approximately 9.30am, Mr Cooper informed the Acting Chief Inspector of Coal Mines Mr Greg Rowan of the incident and relayed to him the information that had been supplied by Mr Madden. At 10am, Mr Cooper departed Rockhampton for the mine in the company of Mr Greg Lyne, Inspector of Mines.

## 5. INVESTIGATION

### 5.1 AIM

The aim of this investigation has been to determine the nature and cause of the accident and make recommendations to reduce the potential for a recurrence of a similar accident in the coal mining industry.

### 5.2 INVESTIGATION PROCESS

The investigation process consists of four parts. These are summarised as follows:

#### Part 1 EVIDENCE (Sections 5.3, 5.4, 5.6, 5.7)

The gathering of evidence from:

- Inspection of the accident scene - accurate recording of observations, including the use of photography/video/audio.
- accurate and comprehensive surveying of the accident scene and production of appropriate plans.
- seizure of appropriate physical evidence
- Interview statements
- Engineering investigation of equipment.
- Gathering of appropriate documentation including training records, authorisations, records of drug and alcohol testing, open cut examiners statutory report, two way communication log and associated tape recording, operators manuals, mine standards, training standards and material.
- Site Senior Executive's Report

#### Part 2 SEQUENCE OF EVENTS (Section 5.8)

The sequence of events leading up to and following the accident was developed from the interview statements and other documentation.

#### Part 3 COLLATION OF EVIDENCE (Sections 5.9)

In this part, the evidence gathered from Part 1 has been reviewed and collated.

## Part 4 ANALYSIS OF EVIDENCE (Sections 5.10)

The BHP Incident, Cause, Analysis Method (ICAM) has been used to identify the causal factors that contributed to the accident.

### Part 1

#### 5.3 INSPECTION OF THE ACCIDENT SCENE

Mr Lyne and Mr Cooper arrived at the Blackwater Mine at 12.20pm, where they were met by Mr Madden who then drove them to the scene of the accident.

The access road to the accident scene had been roped off from both directions and Mr Bruce Treasure, Safety Manager for the Blackwater Mine, positioned at the scene to guard it from unwanted personnel until 7pm when Eagle Investigation and Security Services personnel were to continue with 24hr security of the area.

Present at the accident scene were:

- Senior Constable Greg Dwyer, Blackwater Police,
- Senior Constable Mark McLachlan, Scenes of Crime photographer from Emerald,
- Mr Stuart Vaccaneo, Industry Safety and Health Representative,
- Mr Stephen Smyth, Industry Safety and Health Representative,
- Mr Paul Byrne, Site Safety and Health Representative, and
- Mr Doug Hawley, Workplace Health and Safety Officer from Emerald.

Mr Hawley's presence at the accident scene was at the request of Senior Constable Dwyer who was not certain, because of the nature of the incident, who had jurisdiction. A discussion on the jurisdiction was then held between Senior Constable Dwyer, Mr Hawley, Mr Madden, Mr Lyne and Mr Cooper where it was explained that as the accident had occurred on a mining lease within the boundaries of the mine, the accident came under the jurisdiction of the *Coal Mining Safety and Health Act 1999*. With this explained, Mr Hawley offered his assistance, if required, and left the accident site.

Prior to the arrival of Mr Lyne and Mr Cooper, the deceased had been transported by ambulance to the Blackwater Hospital and those persons involved in the incident, rescue and attempted revival of the deceased had been taken to the Administration Building for a debriefing, writing of statements and to await possible questioning.

##### 5.3.1 Photographs of the Accident Scene

Photographs of the accident scene were taken by the Queensland Police (70), Mines Inspectorate (26), Workplace Health and Safety Officer (19), BMA Blackwater (31) and Industry Safety and Health Representatives. 14 selected photographs shown in Appendix 2 will be referred to throughout this report.

##### 5.3.2 Video Recording of the Accident Scene

A video recording of the accident scene was taken by Senior Constable McLachlan.

Appendix 31



### 5.3.3 Observations

Observations of the site were made and summarised below:

- Two trucks, an International Acco 2350E fitted with an Ozzy Crane Borer and a Mitsubishi FK457 fitted with a HMF Handy 622-K2-B2 Crane at the rear, were found located beside each other, facing north, parallel to the back access road. (Photograph CB -1 Appendix 2)
- The Ozzy Crane Borer on the International Acco truck had been extended out perpendicular to the side of the truck towards the rear of the Mitsubishi FK 457 truck and the Ozzy Crane winch rope attached, by a chain, to the end of the jib of the HMF 622-K2-B2 Crane. The jib was extended and located in a near vertical position adjacent to the passenger's side controls of the crane. (Photographs CB -2, CB -12 Appendix 2)
- The Mitsubishi truck had both stabilisers at the rear extended out and to the ground. The driver's side stabiliser had been extended to the ground 775mm and the passenger side 945mm. (Photograph CB -3 Appendix 2)
- The jib ram was extended 30-40mm and the jib extension ram 1155mm. (Photograph CB -4 Appendix 2)
- The rear wheels of the Mitsubishi truck had chocks located behind the wheels. (Photograph CB -3 Appendix 2)
- A bed log with a lifting chain attached was located on the ground facing a NW direction between the trucks. (Photograph CB -5 Appendix 2)
- Two jerry cans of diesel and two plastic pads were located between the bed log and the side of the Mitsubishi FK 457 truck. (Photograph CB -5 Appendix 2)
- The cap was off the fuel tank of the Mitsubishi FK 457 truck and hanging from a small chain at the side of the tank. (Photograph CB -6 Appendix 2)
- The fuel tank was dipped and found to be half full.
- There was a steel framed module on the tray of the Mitsubishi FK 457 truck containing tool boxes, hardware, generator, jerry cans of diesel and unleaded fuel, etc. (Photograph CB -3 Appendix 2)
- The control levers and guard for the HMF 622-K2-B2 Crane on the passenger's side of the truck had been bent towards the rear of the vehicle, some of the hinge points for the levers broken and the jib raise/lower control lever knob forced off onto the ground. (Photographs CB -7, CB -8 Appendix 2)
- The jib control lever (3<sup>rd</sup> from the right) on the driver's side had a broken pivot casting, making the lever inoperable in the downward direction. (Photograph CB -9 Appendix 2)

Mr Michael Downs, Regional Manager - Safety and Health, Central Region, arrived at the scene. It was agreed that an engineering assessment of the HMF 622-K2-B2 Crane should be conducted, so it was arranged for Mr John Smith, District Inspector of Mines and Mr Bruce McKinnon, Inspection Officer, both from Mackay, to be on site on the 13<sup>th</sup> April.

### 5.3.4 Plans of the Accident Site

The following plans of the accident site were drawn up by the BMA Blackwater Mine survey department.

- Blackwater Mine Locality Map – File:BW-0055.cdr
- Ergon Accident 12/04/2002 General Mine Location Plan – Plan No. ACCPLN5
- Ergon Accident Plan 12/04/2002 – Plan No. ACC1. Drawing shows the location of the vehicles at the accident scene.
- Ergon Accident Plan 12/04/2002 – Plan No. ACC2. Drawing shows the location of the International Acco truck, the Mitsubishi FK 457 truck and the items adjacent to them.
- Ergon Accident 12/04/2002 – Plan No. ACC3. Drawing shows the main dimensions of the area around the passenger's side controls of the HMF 622-K2-B2 Crane.

These plans are in Appendix 3

### 5.3.5 Articles seized from the Accident Scene.

Articles seized from the scene and held as evidence included:

- The deceased's pens and notebook found on the ground.
- The knob off the passenger's side jib control lever that had been forced off onto the ground during the incident.
- The Mitsubishi FK457 - Maintenance Book
- The Mitsubishi FK457 - Vehicle Usage Log
- The Mitsubishi FK457 - Site Daily Report Book
- The Mitsubishi FK457 - Vehicle Inspection folder.
- Instruction Manual for HMF 622-K2-B2 (some photocopied pages stapled together).

The incident scene was to remain secure and untouched until testing on the HMF 622-K2-B2 Crane and further examinations of the scene were completed.

### 5.4 INTERVIEW STATEMENTS

On the afternoon of the 12/04/02, Mr Downs, Mr Lyne and Mr Cooper returned to the Administration Building, Blackwater Mine, where a witness list and schedule were developed. An interview panel comprising:

- Mr Cooper and Mr Lyne – Inspectors of Mines
  - Mr M Madden – Site Senior Executive
  - Mr David Scott – BMA Technical Services Manager
  - Mr Ron Groenland – BMA Manager – Safety
  - Mr Stuart Vacaneo – Industry Safety and Health Representative,
- interviewed the three Ergon Energy employees ( Mr Brian Kelly, Mr Daniel Fitzpatrick, Mr Kerrod Smith) who were witnesses to the accident. During this process, Senior Constable Dwyer took a statement from Mr Brian Kelly. (Appendix - 5)

On Saturday the 13/04/02, an interview panel comprising:

- Mr Cooper and Mr Lyne – Inspectors of Mines
  - Mr M Madden – Site Senior Executive
  - Mr David Scott – BMA Technical Services Manager
  - Mr Stephen Smyth – Industry Safety and Health Representative
  - Mr Gordon Clark – Site Safety and Health Representative,
- interviewed another 10 people. (Appendix - 5)

Statements have been obtained from all persons listed below.

#### WITNESS SCHEDULE / LIST

INTERVIEW		NAME	OCCUPATION	NATURE OF EVIDENCE
DATE	TIME			
12/4/02		D Fitzpatrick	Ergon Energy – Power worker	Witness to incident
12/4/02		K Smith	Ergon Energy – Electrical linesman	Witness to incident
12/4/02		B Kelly	Ergon Energy – Power worker	Witness to incident
13/4/02		T McKean	BMA - Electrician	Witness to recovery

13/4/02		B Ballanay	BMA - Electrician	Witness to recovery
13/4/02		R Deleforce	BMA - Contracts Mgr	Supporting evidence
13/4/02		J Axelsen	BMA - Elect Engineering Mgr (Sth)	Supporting evidence
13/4/02		E Muirhead	BMA - Open Cut Examiner	Witness to recovery
13/4/02		F Paull	BMA – Rescue team member	Witness to recovery
13/4/02		N Dalton	BMA – Rescue team member	Witness to recovery
13/4/02		R Kelly	BMA – Rescue team member	Witness to recovery
13/4/02	3.20pm	J Kadel	BMA – Rescue team member	Witness to recovery
13/4/02	4.20pm	G Williams	Ergon Energy – Site Project Mgr	Supporting evidence

On Wednesday the 8/05/02, further questioning of the Ergon Energy employees (Mr G Williams, Mr B Kelly, Mr D Fitzpatrick and Mr K Smith) was carried out at the Ergon Energy Depot, Blackwater by Mr Cooper – Inspector of Mines and Mr Robert Clark – Inspection Officer. On Tuesday the 28/5/02, Mr Cooper carried out further questioning of Mr G Williams and Mr B Kelly. (Appendix - 5).

## 5.5 ENGINEERING INVESTIGATION OF THE EQUIPMENT

### 5.5.1 Investigation

On Saturday the 13/04/02, an engineering investigation was conducted by Mr J Smith, District Inspector of Mines (also Mechanical Inspector of Mines) NR&M, appointed to the position of Mechanical Inspector in 1984 and Mr B McKinnon, Inspection Officer NR&M, appointed to the position in 1997.

The Inspectors were assisted by Mr John Laidsaar, Senior Maintenance Engineer, Blackwater Mine.

Observers during the investigation were;

- Mr B Treasure - Safety Manager, Blackwater Mine.
- Mr P McLaughlin - Electrical Engineering Manager, Blackwater Mine.
- Mr W Irving - National Business Development Manager, Cranes RED AUSTRALIA, contracted to Blackwater Mine.
- Mr S Vaccaneo - Industry Safety and Health Representative.
- Two persons from the Blackwater Mine workforce.
- Three persons from Ergon Energy.

As part of the investigation, a re-creation of the accident using a dummy was conducted and a video recording made. (Appendix - 31)

### 5.5.2 Results of the Investigation

On the 16<sup>th</sup> April, a report on the results of the engineering investigation carried out on the HMF 622-K2-B2 Crane including digital photographs, was supplied to Mr Cooper by Mr Smith.

Conclusions of the investigation were:

- a) The jib control lever on the right hand side was broken and inoperative in the downward direction. Appearance suggests this defect occurred sometime prior to the accident.
- b) Damage to the left hand side valve bank and levers appears to have been caused by the incident.

- c) No mechanical defect was discovered in the crane mechanism.
- d) No hydraulic leaks were observed, load lock valves were operational.
- e) All hydraulic functions of the crane operated correctly, when tested.
- f) The spools in the valve bank self centred and moved freely when activated. No comment can be made as to their operation, with levers fitted, prior to the incident.
- g) It was observed in the re-creation that the jib -
  - (a) would close onto the valve bank leaving no space for a person to remain safe,
  - (b) the contact with the valve was with considerable force,
  - (c) the final part of the travel of the jib was at increased velocity.

The Engineering Report by Mr Smith is attached in Appendix 4

### 5.5.3 Additional Testing

On Sunday the 14/04/02, additional testing of the HMF 622-K2-B2 Crane using two functions at once, were performed.

Mr John Laidsaar, Senior Maintenance Engineer, Blackwater Mine, carried out modifications to the control levers so that the functional testing could be conducted from the driver's side controls in safety.

It was found that when using the hoist and jib functions simultaneously, the hoist always took priority over the jib, preventing it from operating, regardless of the order in which the levers were pushed.

Observers during this function testing were;

- Mr Cooper and Mr Lyne - Inspectors of Mines
- Mr M Madden - Site Senior Executive
- Mr B Treasure - Safety Manager, Blackwater Mine.
- Mr D Scott - Technical Services Manager, Blackwater Mine.
- Mr S Vaccaneo - Industry Safety and Health Representative.
- Mr S Smyth - Industry Safety and Health Representative.
- Two Site Safety and Health Representatives from the Blackwater Mine.

The jib control lever with the cracked pivot casting was removed and seized from the controls on the driver's side and kept as evidence. At the completion of these tests, the accident scene and associated vehicles were released from the seizure notice back to the BMA Blackwater Mine. A video recording of the testing is in Appendix 31.

A Mine Record Entry covering the events from the 12<sup>th</sup> to the 14<sup>th</sup> April was made before Mr Lyne and Mr Cooper departed the mine. (Appendix 6)

## 5.6 DOCUMENTATION

### 5.6.1 BMA Blackwater Mine Documentation

Management at the Blackwater Mine was requested to provide the following information.

- Ergon Contract and Safety Management System.
- BMA Training/Assessment Package for the operation of the vehicle loading crane.
- BMA authorisations for driver/operators (Ergon employees)
- Induction material for Ergon employees.
- Copy of audits in Ergon area.
- Records of Drug and Alcohol testing (Ergon employees)
- Electrical Authorisations (switching)
- Copy of the mine Training Scheme.
- OCE Report for the 12/04/02.
- Two way radio communication log and tape recording.
- Medical Records
- Surveyor Plans

The documentation provided on the 16/04/02 is listed in Appendix 7

The Electrical Authorisations for Switching as requested were not provided as Ergon employees are not authorised to undertake this work at Blackwater Mine.

### 5.6.2 Ergon Energy Documentation.

Management of Ergon Energy was requested to provide the following information.

- Maintenance Records - Services, Log Book, Previous 12mths.
- Training Records - Project related, Competencies for mine site.
- Inductions - Site Inductions (SGS), Generic Mine Inductions.
- Safety Meetings - Project specific minutes.
- Mechanical Records - Vehicle History.
- Training/Assessment material for HMF Crane for all Ergon employees involved.
- Manufacturer Instruction Manual for the HMF – Handy 620 Crane.

The documentation provided is listed in Appendix 8

## 5.7 SITE SENIOR EXECUTIVE'S REPORT

An investigation report on the accident was received on the 10<sup>th</sup> May 2002 from Mr M Madden, Site Senior Executive – Blackwater Mine. This is in accordance with Section 201.(1) of the *Coal Mining Safety and Health Act 1999*.  
(Appendix 3)

Although the report is very comprehensive and detailed in its content, I believe the following comments need to be made.

## 5.7.1 Comments on Report

### *Section 1.5 Key Learnings*

*This section does not address the failure of the audit system or the competency of the people conducting the audits to identify this hazard although this is mentioned in section 4.5.2.*

### *Section 2.6 Key Finding of the Investigation*

*With my experience in working around equipment such as continuous miners, I have found that a competent operator should not require different shaped knobs or coloured knobs to know which lever to operate. Often the working environment is such that colours will not last. Another concern of having coloured or different shaped knobs on levers is that if a knob or lever is mistakenly moved to a different function during maintenance activities, a hazard that could result in a high potential incident, could be introduced.*

### *Section 2.7 Detailed Sequence of Operation of VLC Prior to the Accident*

*In the paragraph titled **Preparation**, the sentence "The Jib was raised by lifting the extension lever upwards (lever 3)" is incorrect in a number of ways, as the extension lever is lever 4 not lever 3, and pushing lever 4 upwards wouldn't lift the jib, it would extend the jib. I believe the word 'extension' was meant to be 'jib' for the sentence to make sense.*

### *Section 3.1 Absent / Failed Defences*

*I do not agree with the dot point that states "Failure to guard the control levers to prevent accidental activation", as in my opinion the guard that was provided was acceptable and from the evidence, played no part in the accident.*

### *Section 3.2 Individual / Team Actions*

*I do not believe the dot point that states "Unloaded the bed log close to the operator's position (within 2.5 metres)", is a hazard, as an item located at the rear of the truck tray could be within 1 metre of the operator. AS 2550.1-1993 Cranes-Safe use Part 1: General requirements - states in 4.5 Clearances (a) **Clear width not less than 500mm**. The crane being able to be slewed within the angle of the controls was the hazard, not how close the bed log was unloaded.*

### *Section 3.4 Organisational Factors*

*The second dot point states "Current National and Black Coal Industry Training Packages and Assessment criteria does not specify critical items (eg: working under the boom)". The Black Coal Competency Unit: MNC.G50.A states in the Range of Variables that Australian Standard AS 2550 must be consulted and applied. In AS 2550.1, under section 7.9.1 – Crane Operation - General, it states: When operating a crane, the crane operator shall-*

- (k) when loads have to be handled in the vicinity of persons, **be alert to the possibility of persons being trapped and injured by the movement of the crane or load and exercise due caution.** Where the person controlling the*

*load or others may be trapped, do not move the crane or load unless their safety is assured.*

*Although the Standard does not specifically mention working under the boom, it does address that possibility in the above section. Also in the Operator Training Manual for the Vehicle Loading Crane (Appendix 21) developed against the Black Coal Competencies for the BMA Blackwater Mine, it states under **Safety Norms – To operate the crane: Point 18 - Avoid swinging the load above the control station. In cases where the load is too close, the crane must be operated from the opposite side.***

#### **Section 4.6 Training and Competency**

*In the second paragraph, it states “In November the work group were trained and certified to operate a VLC.” Evidence gathered from statements indicated that the training began on the mine site in July 01 and was conducted by Ergon employees not authorised to train on site. Also none of the work group were authorised to operate the VLC on site before the 27/11/01, the date that they were assessed in the operations of the VLC. Section 5.9.3 a) of my report explains how the training and assessment was not to the Black Coal Competencies.*

*In the third paragraph, it states “At the time of the accident, Chris Belfield held formal WH&S certification.” This is correct with regard to the C2 Slewing Mobile Crane, assessed on the 4/4/02, which encompasses the CV Vehicle Loading Crane. However, the CV Vehicle Loading Crane certification ceased 60 days after the 27/11/01. WH&S have a policy that a person is deemed competent for 60 days following the date of the assessment and within that period must apply for a certificate. If the person doesn't apply, he cannot operate that equipment until he passes an assessment for the Recognition of Current Competency (RCC). Chris Belfield was assessed on the VLC on the 27/11/01 and never received a certificate due to a delay in submitting the application/assessment form. This meant that under WH&S, Chris Belfield was not certified to operate a VLC greater than 10 metre/tonnes between the dates of the 26/1/02 and 4/4/02 in outside industry.*

#### **Section 4.6.1 Chris Belfield – Power Line Worker**

*The first paragraph states “Chris Belfield had been authorised to operate a VLC on Blackwater Mine in compliance with the Coal Mining Safety and Health Act 1999”. The Coal Mining Safety and Health Act 1999 requires that training and assessments are to meet the Black Coal Competencies and Chris Belfield was not trained or assessed against these.*

## **Part 2**

### **5.8 SEQUENCE OF EVENTS**

1. Chris Belfield had worked every day from the 2<sup>nd</sup> April to the day of the accident, 12<sup>th</sup> April – a total of 105hrs including 13hrs on the 11<sup>th</sup> April.
2. On the 11<sup>th</sup> April, at the BMA Blackwater Mine, Brian Kelly loaded a bed log onto the rear of the Mitsubishi FK 457 truck using the HMF 622-K2-B2 crane fitted to the rear of the truck.

3. On the afternoon of 11<sup>th</sup> April, Chris Belfield drove the International Acco truck fitted with the OZZY Crane Borer from Rockhampton to Blackwater arriving at the Capricorn Hotel at 9.30pm. At 10pm, he asked Brian Kelly to wake him in the morning at 5am.
4. At 5am on the 12<sup>th</sup> April, Chris Belfield was awakened by Brian Kelly.
5. At 6am, the Ergon Energy crew (Kerrod Smith, Brian Kelly, Chris Belfield & Daniel Fitzpatrick) departed the Capricorn Hotel for Blackwater Mine. Chris Belfield drove the International Acco truck, Daniel Fitzpatrick the Mitsubishi FK 457 truck, and Brian Kelly travelled with Kerrod Smith in the Nissan 4X4.
6. At approximately 6.30am, the Ergon Energy crew arrived at and entered the Blackwater Mine via the entry that the Cook Contractors (Pre-strip contractor) use, unhooked a trailer at the Ergon Energy lay down area and proceeded to Ramp 48 to carry out a planned transformer installation and electrical isolation.
7. At 7am, the installation of the transformer onto the pole commenced but the electrical isolation had to be cancelled due to missing fittings for the transformer.
8. At 7.35am, Kerrod Smith rang John Axelsen (BMA Electrical Engineering Manager) to notify him that the electrical isolation had to be cancelled. John Axelsen rescheduled it for the following week.
9. Kerrod Smith instructed Chris Belfield and Brian Kelly to return to the lay down area and unload the Mitsubishi FK 457 truck ready for the next task of loading conductor wire at the Kenmare fans.
10. Chris Belfield drove the Mitsubishi FK 457 truck and Brian Kelly drove the International Acco truck back to the lay down area, arriving at 8.15am. Chris Belfield parked the Mitsubishi FK 457 truck parallel to the back access road facing north while Brian Kelly parked the International Acco truck approximately 25m behind and 40m from the access road.
11. Chris Belfield left the Mitsubishi FK 457 truck running and pulled out the driver's side stabiliser while Brian Kelly climbed onto the back of the truck from the passengers side.
12. Chris Belfield pulled out the passenger's side stabiliser and stated he was going to remove the bed log off the truck.
13. Chris Belfield gets a 1.5m chain from the chain locker and puts it onto the back of the truck.
14. While Brian Kelly puts the chain around the bed log, he feels the rear of the truck rise as Chris Belfield sets the stabilisers to the ground.
15. Chris Belfield unfolds the HMF 622-K2-B2 crane using the passenger's side controls. This was the correct procedure to follow as the crane unfolds from the transport position towards the driver's side. After unfolding the crane, the boom and jib were slewed around to the right, over the top of Chris Belfield, over the passenger's side of the truck coming to a stop over the bed log.
16. Brian Kelly attached the chain from the bed log to the hook of the crane and Chris Belfield lifted the log and slewed it to the left over the passenger's side of the truck and lowered it to the ground. During this operation, the jib was extended to reach the final position of the bed log. At the same time, Daniel



Fitzpatrick arrived at the lay down area driving the Hino FF Sherrin Hire EWP truck which had been used at Ramp 48 and parked it behind and approximately 5m to the right of the Mitsubishi FK 457 truck.

17. Chris Belfield unhooked the bed log chain from the crane. At the same time, Brian Kelly picked up a set of double lifting chains and was getting ready to get over an empty cable drum situated in the middle of the module on the tray of the Mitsubishi FK457, so he could attach the chains to the module. Kerrod Smith arrived at the lay down area in the Nissan 4X4 and Chris Belfield waved to him as he drove past.
18. **At approximately 8.30am, Chris Belfield pushed down the control lever that closes the jib of the crane causing the jib to move in towards him.** Brian Kelly who was facing away from Chris Belfield heard a change in the sound of the truck engine which indicated that the crane was being operated.
19. Brian Kelly heard a muffled cry from behind him and turned to see the jib of the crane across Chris Belfield's back, crushing him against the controls.
20. Brian Kelly screamed out "Chris" which attracted the attention of Kerrod Smith and Daniel Fitzpatrick. Brian Kelly jumped down from the driver's side of the truck and attempted to free Chris Belfield by using the controls on that side. As these control levers were mechanically linked to the controls on the passenger's side which Chris Belfield was crushed against, they could not be operated. Brian Kelly noticed the control lever for operating the jib from the driver's side, was broken at the pivot point.
21. Kerrod Smith and Daniel Fitzpatrick tried to manually pull the jib off Chris Belfield without success. Kerrod Smith yelled to Daniel Fitzpatrick to jump into the International Acco truck and drive it around parallel to the passenger's side of the Mitsubishi FK 457.
22. Daniel Fitzpatrick did this and Brian Kelly jumped onto the controls of the OZZY crane. Daniel Fitzpatrick who noticed the engine of the Mitsubishi FK 457 truck was still running, ran around and turned it off. Brian Kelly realising the International Acco truck was too close to the Mitsubishi FK 457 called out for Daniel Fitzpatrick to reposition the International Acco truck. Daniel Fitzpatrick then jumped into the truck and repositioned it out towards the road a metre or so. At the same time, Kerrod Smith called in the emergency.
23. At 8.33am, Kerrod Smith called in the emergency on the mine radio. "Emergency, Emergency, Emergency"
24. Brian Kelly set the stabilisers on the International Acco truck and slewed the crane boom around so that it was pointing at the jib of the HMF 622-K2-B2 crane.
25. Two Blackwater Mine electrical tradepersons, Terry McKean and Brian Balanay who were passing the lay down area at the time the emergency call was made, stopped and returned to the accident scene.
26. Daniel Fitzpatrick connected the rope from the OZZY crane, with a chain, to the jib of the HMF 622-K2-B2 crane. At the first attempt to pull the jib, the chain slipped, so then it was connected around the hook and the jib successfully pulled away, releasing Chris Belfield.
27. Daniel Fitzpatrick pulled Chris Belfield away from the truck and along with Brian Balanay commenced CPR until the rescue personnel arrived and relieved them. No vital signs were detected.

28. QAS arrived and Chris Belfield was transported to the Blackwater Hospital with the Police and Blackwater doctor following. Chris Belfield was pronounced dead on arrival.

### **Part 3**

#### **5.9 COLLATION OF EVIDENCE**

##### **5.9.1 Evidence from Accident Scene**

###### **a) Environment**

1) The conditions in the area were excellent with:

- The laydown area where the accident occurred, being a dry, flat, cleared, hardstand area adjacent to the back access road, (Photograph CB -1 Appendix 2) and
- The weather on the day, warm, with minimal wind and a clear blue sky.

2) The items found in close proximity of the accident site were:

- a hardwood timber log (bed log) 1470mm X 380mm(small end) X 490mm(large end) with a chain sling (6mm dia., Grade T) attached around the middle.
- Two jerry cans full of diesel.
- Two rubber mats
- Pen, marking pen and notebook.
- Hard hat and sun visor, and
- Knob off passenger's side jib raise/lower control arm.

The location of these items are shown on Plan No. ACC2 (Appendix 3) and (Photograph CB -10 Appendix 2).

3) The location of equipment in the area is shown on Plan No. ACC1. (Appendix 3)

###### **b) Equipment**

1) Mitsubishi FK 457 truck (Registration No 996-BOW) fitted with a vehicle loading crane.

- Model FK 457K
- Delivery date 12/6/92
- Accessories
  - Tray top body with a marine ply deck
  - 60 litre water tank
  - Under body tool box
  - Air & electric trailer brakes
  - Flashing light
  - Vehicle Loading Crane (VLC) fitted to the rear of truck.
    - Type HMF 622-K2-B2
    - Fabrication No 9148312
    - Fabricated in 1991
- General appearance of the truck indicated acceptable housekeeping standards apart from the Registration label out of date (02/2002) and the fuel tank having the cap, off and hanging from a small chain down the side. (Photograph CB -6 Appendix 2)

- Truck was facing in a northerly direction with the crane stabilisers extended and set to the ground. Both rear wheels had been chocked from the rear. Mr N Dalton, a member of the mines rescue, placed the chocks under the wheels on arriving at the accident scene.
- Documentation seized from the vehicle consisted of:-
  - \* **20 photocopied pages of the 'Instruction Manual for HMF Handy 620' stapled together.** (Appendix 30) The contents of these pages covered:
    - Description
    - Operating Instructions
    - Classification
    - Accessories
    - The Hydraulic System
    - Maintenance
    - Mounting Instructions, and
    - Technical Data

On page 8 of this document, in section 2.7 - Operating the Loader, it states **'Whenever possible, the loader should be operated from opposite side from where the load is suspended in order to avoid personal injuries in case of accident.'**

**'ROAD TRAVEL WITH SUSPENDED LOAD AND PRESENCE UNDER A WORKING LOADER IS NOT PERMITTED.'** (Appendix 22)

- \* **Vehicle Maintenance Book** – VEH.01160 was used to record any defects on the truck and crane. The last entry made was on the 2/4/02. Only two entries refer to the crane.
  - 10/8/01 Replace handle on crane (Page reference No 26309)
  - 24/10/01 HMF truck crane creeping with suspended load. (Page reference No 26311)
- \* **Vehicle Usage Log** – First entry was made on the 14/8/97 and the final on the 14/12/01. **Chris Belfield made his first entry on the 21/8/01 and all remaining entries up to the 14/12/01. (12 in all) No entries were made in 2002.** (Appendix 14)
- \* **A folder** with 'VEH 1160, Mitsubishi FK 457 (Crane Truck), Vehicle Inspection' printed on the front cover, and containing:
  - CAPELEC Work Instruction – Manage, Monitor and Maintain Fleet. I.D. PC45BI02. The purpose and scope of this document is 'To provide instruction for managing and monitoring fuel usage, condition based maintenance, scheduled maintenance, unscheduled maintenance and repairs and fleet performance.' **Under the section titled 'Pre operational Checks and Inspections' 2.4, it states 'The Vehicle Custodian shall:**

**2.4.1 carry out checks and inspections and services as determined by Reports PC45BR02, PC45BR03, PC45BR04 or PC45BR05 depending on the unit type. Report PC45BR03 refers to – Truck Maintenance Checks and Services while**

**Report PC45BR05 refers to – Crane/Borer Vehicle  
Maintenance Checks and Services.**

**2.4.2 record and advise immediate supervisor of any defects  
and arrange rectification.'**

- Three **PC45BR03** Forms and one **PC45BM03** Form - Damage to Property or Fleet Unit.
  - **Two PC45BM04 Forms – Inspection Records.** These forms showed every day of the year that a daily inspection was carried out, through the operator assigned to the equipment signing his initials beside the date. One of these forms was partially filled out for the year 1999. **The other, for 2001, has been initialled by Chris Belfield on most of the days that have been entered into the Vehicle Usage Log for 2001. The year on this form was then changed to 2002 by Mr Robert Cole who initialled the form on the 6/3/02, after completing a monthly inspection (signified with the preceding “M”). No other dates have been initialled for 2002. (Appendix 25)**
- The HMF (Hojbjerg Maskinfabrik) 622-K2-B2 Crane is a **vehicle loading crane (VLC)** which is generically designed to be fitted to a variety of vehicles. As part of the design, it has two sets of controls allowing it to be operated from either side of the vehicle. The control levers on each side are connected so that the operation of each function is the same on either side. However, the layout of the control levers on one side is a mirror image of that on the other. **The capacity of a VLC is measured in metre tonnes which is calculated by multiplying the maximum load (L) that can be lifted by the radius (R) at which that load is lifted ie L x R. For the HMF 622-K2-B2, this is 2850kg x 2.1m = 6 metre tonnes.** Further description of the vehicle loading crane is available in Section 6.7 of the Site Senior Executive's Report – Appendix 3
- The HMF 622-K2-B2 Crane was found unfolded and the crane extended over the passenger's side of the truck, slightly forward of perpendicular to the side of the truck, with the jib extension ram extended 1155mm, the jib ram approximately 30mm and the boom ram 460mm. The jib was almost vertical adjacent to the passenger's side control levers. The control levers and guard over the levers had been bent towards the rear of the vehicle as a result of the accident. The dimensions of the area for operating the passenger's side controls are shown on Plan No. ACC3. An Engineering Investigation of the crane was conducted (section 5.5) with the following results:
1. **The jib control lever on the right hand side was broken and inoperative in the downward direction. Appearance suggests this defect occurred sometime prior to the accident.**
  2. Damage to the left hand side valve bank and levers appears to have been caused by the incident.
  3. **No mechanical defect was discovered in the crane mechanism.**

4. No hydraulic leaks were observed, load lock valves were operational.
5. **All hydraulic functions of the crane operated correctly, when tested.**
6. The spools in the valve bank self centred and moved freely when activated. No comment can be made as to their operation, with levers fitted, prior to the incident.
7. **It was observed in the re-creation that the jib -**
  - (a) **would close onto the valve bank leaving no space for a person to remain safe,**
  - (b) **the contact with the valve was with considerable force,**
  - (c) **the final part of the travel of the jib was at increased velocity.**

The stabilisers had been extended out and set to the ground. The driver's side stabiliser ram was extended 775mm to the ground and the passenger's side 945mm.

**The operational schematics located above each control lever on the passenger's side controls were in excellent condition and easily read. (Photograph CB -7 Appendix 2)**  
**The arrows on the faces of the control lever knobs for the functions of the crane on both sides were partially worn but still legible. (Photographs CB -7 & CB -9 Appendix 2).**

- 2) International Acco 2350E truck (Registration No 731-BXT) fitted with an OZZY Crane Borer.
  - Model 2350E
  - Accessory
    - OZZY Crane Borer
    - Model 5/10 - 14
    - Serial No 1007
  - Truck was facing in a northerly direction, parallel to the access road and the Mitsubishi FK 457 truck. All four stabilisers had not been extended out but had been set to the ground, lifting the truck clear of the ground. The boom of the OZZY Crane Borer was turned towards the Mitsubishi truck perpendicular to the side of the International Acco truck and pointing at the jib of the HMF 622-K2-B2 Crane. The winch rope from the Ozzy Crane was attached, by a chain, around the hook of the jib on the HMF 622-K2-B2 Crane and under tension. (Photograph CB -2 Appendix 2)

### 5.9.2 Evidence from Statements

As previously stated, evidence from statements was used to construct the Sequence of Events (Section 5.8). Listed below is additional evidence from the statements/interviews.

#### a) Geoffrey Williams – Project Manager/Site Manager

- **How do you know they (Ergon team) are competent? - “My guys are using the machinery all the time.”**

- Risk assessments are conducted on each days work activities.
- A work activity assessment audit was conducted 6-8wks prior to accident.
- Corrective maintenance was carried out by G&D Mechanical and Hanson Tyres. Mains Roads in Richardson Road, Rockhampton are the main contractor.
- **Fatigue is left up to the individual – “I rely on their judgement, based on project timing.”**
- The training guidelines for Hiabs are based on the Forestry Guidelines.
- There was a lot of traffic on the mine’s two way system.
- GW had known Chris Belfield for a couple of years.
- Work activity assessment covers PPE, Traffic signage, manual handling.
- Visited site five or six times in the past three weeks.
- The Mitsubishi truck had been assigned to Chris Belfield and he had been operating it for the past two years.
- **Who completed the training? - “John Buchanan. Basically, I didn’t know there was a ticket until last year. When I found out you could get a ticket for vehicles of this size I had the course emailed to me then formalised an assessment.”**
- Vehicle compliance inspections were completed each year.
- Risk assessment training – Both Kerrod Smith and Geoff Williams have completed S1 and G2 risk management training. Other fellows have completed informal awareness sessions. Training conducted by Peter Arthur of Cost Effective Training.
- A safety meeting is planned on a monthly basis but in reality occurs every 2-3 months.
- **Checking that the daily vehicle inspections were being conducted and defects recorded in the logbook, were not part of the work activity assessments. It was the duty of the operator to do these.**
- **The Inspection Record and Vehicle Usage Log were never checked for compliance.**
- **On the job experience at operating the VLC and Ozzy Crane Borer was through Steve Cowley and to a lesser extent Graham Bedford.**
- **No official training for Ozzy Crane Borer.**
- **No other material or documentation was given to workmen during their training.**
- **Forms PD-FSAF006 (Contractor/Equipment Authorisation) provided to the BMA Blackwater Mine were forms previously used at the Peak Downs Mine which had the information removed, forms photocopied and the information on the Blackwater Ergon Team entered by the administration assistant at the Ergon office.**

#### b) Kerrod Smith – Team Leader

- 22 months with Ergon Energy
- **Team had used the Mitsubishi truck for 12 months while they had been on site.**
- Mitsubishi truck was assigned to Chris Belfield.
- **K.S. didn’t know of any problems with the VLC.**
- **Majority of the team operated the VLC during the past 12 months.**
- **Chris Belfield began training on the VLC after a couple of months on the job, around about July.**
- **“Chris Belfield was more than competent. The biggest shock I saw was seeing Chris on that side of the Hiab. We normally operate the controls from the opposite side. I could not understand why he was operating from the same side as the load. I have seen Chris climb over poles to get around the other side.”**
- Not aware of the broken control lever

- *How do the levers on the driver's side operate?* – “On that one Up is down and if pushed Down the arm should Raise.” **This is correct for the boom but not for the jib operations.**
- Learnt use of VLC working with QR - probably 16 years in daily use of loading cranes.
- **Operated VLC at BMA Blackwater Mine prior to assessment in November.**
- *Was it normal to operate the VLC from the same side you load or unload gear?* – “Um, depending on what you were doing. If you were lifting something off the ground, you would have to be on that side to see that you were getting off the ground OK, but normally you would operate it from the other side especially in unloading trucks with poles on them or something like that.”
- **Chris Belfield was trained by Steve Cowley (Team Leader at the time) and Graham Bedford.**
- Daily maintenance checks were carried out and weekly inspection on whole truck.
- **Kerrod Smith was aware daily inspections were required but he did not check that they were being done.**

c) **Brian Kelly – Ergon Energy team member**

- BK worked with Chris Belfield since May 01.
- **BK thought Chris Belfield was doing the job normally. He had worked with Chris doing similar jobs on a number of times.**
- **BK operated the VLC on the day before (11/4/02) to lift the bed log onto the truck. He used the passenger's side controls and didn't notice broken lever on driver's side.**
- *What vehicle checks do you do?* – “oil levels, air levels, check everything. All trucks are supposed to have a book, not all trucks do.”
- *What do you check on the Hiab?* – Check for hydraulic leaks.”
- **BK completed the VLC assessment but hasn't received WH&S Certificate.**
- **BK began operating VLC around May/June 01 at BMA Blackwater Mine.**
- BK trained on VLC by Steve Cowley.
- BK received some instructions (2-3dys) on the Ozzy Crane Borer from Darryl Hannah at the beginning of April, prior to being assessed on the 4/4/02. This was at the BMA Blackwater Mine.
- To set the stabilisers, the operator must do this from each side controls.
- **Estimated time between Chris Belfield being crushed and being released was 2-3 mins.**
- **No training material given on VLC. Half a dozen of them went to the Ergo Energy Depot, Glenmore Road where John Buchanan went through with them some paperwork and then conducted the written and practical assessments.**
- **Chris Belfield did not appear fatigued on the morning of the accident. “he's always, like, probably the most careful and astute man that I have ever met. You know, he was a perfectionist at his job.”**

d) **Daniel Fitzpatrick – Ergon Energy team member.**

- DF had worked with Ergon Energy for 3 years.
- **DF knew of no problems with the VLC.**
- DF witnessed Chris Belfield operate VLC quite a few times.
- **DF estimates time to release Chris Belfield was 2-5 mins.**

**e) Ray Delaforce – BMA Contracts Supervisor**

- RD helped secure accident scene and brought other Ergon employees back to the Administration building.
- Contact was made with Centacare to arrange some councillors to come to site for people that required help.
- 3 Ergon employees were asked to provide statements, which they did.
- **RD inspects all major equipment that comes to site. A registered machinery inspection certificate is to accompany vehicle. Mitsubishi truck was categorised as a major item of equipment.**
- **RD inspected the Mitsubishi FK 457 truck on the 19/3/02.**
- **Ergon supplied a copy of the certificate of registration and a machinery inspection completed by the Inspector of Main Roads.**
- *How do you determine competence?* – “When persons undergo induction we obtain copies of certificates – usually I also ask how long they have been operating these pieces of plant.”
- Ergon team had been coming to site off and on from May 01.
- *How do you monitor competency?* – “Competency maintenance is checked on a daily basis by observing what the contractors are doing. Regular audits against a number of items that include safety, housekeeping, etc..”
- *How do you rate Ergon?* – “Ergon would probably be rated the safest people on site because of their background, record, training and good equipment.”
- **RD observed Chris Belfield operating the VLC on a regular basis.**
- **RD would spend on average half an hour each day with the Ergon team and sometimes more if the activity was on private property to ensure fences/gates were closed.**
- **Audits were conducted on a weekly basis with John Axelsen – Electrical Engineering Manager, South Blackwater Area.**

**f) John Axelsen – BMA Electrical Engineering Manager**

- **JA spent 3 to 5 hours with the Ergon team each day that both parties were on site.**
- JA had never seen Chris Belfield operate the VLC, only the truck.

**g) Brian Balanay – Electrical Tradesperson**

- BB and Terry McKean had just driven approximately 200m past the Ergon laydown area when they heard the emergency signal on the radio and heard an Ergon person state a person was crushed against the vehicle.
- They decided to go back and give assistance.
- On arrival, BB grabbed the resuscitation mask from the vehicle and went over to where Chris Belfield was crushed with the jib of the crane. **Checked for vital signs. No breathing or eye movements. Chris Belfield was dark purple in colour.**
- When Chris Belfield was released, BB carried out the compressions while an Ergon employee conducted expired air resuscitation (EAR). **Chest was blue and purple in colour and caved in.**
- CPR continued after mines rescue members arrived.
- Ambulance arrived and took over with mechanical breathing aid and attached electronic monitoring system.
- Chris Belfield was placed onto stretcher and placed into ambulance.



- BB assisted in bunting off area.

#### h) Edgar Muirhead – Open Cut Examiner

- EM had to wait for the conversation on the radio to end before activating the emergency system.
- Called QAS and rescue north. Arranged escorts for town QAS and Kenmare QAS.
- On arrival, some rescue personnel and two electricians were at the scene and the QAS was arriving.
- Secured accident scene and remained at scene with Bruce Treasure, BMA Safety Manager.
- Open Cut Examiner's responsibilities were taken over by Steve Weston.
- **Emergency signal can only be heard on the mine channel, different channel to the Coal Preparation Plants or Pre strip operations.**

#### i) Bob Kelly – Rescue Team Member

- BK drove the rescue truck to the accident scene after picking up Frank Paull.
- **Had trouble with two way communications.**
- On arrival, BK and FP secured the accident scene and assisted with CPR.
- Chris Belfield was placed into ambulance.
- BK drove the ambulance to the hospital while ambulance officer (Phil Baxter) continued CPR.
- **Arrived at the Blackwater Hospital at 9.20am** and assisted with moving the casualty to the trauma ward.

#### j) Frank Paull – Rescue Team Member

- FP placed pressure bandage on wound near left shoulder.
- **Traffic did not give way to the ambulance on the back access road.**
- **Emergency signal on the two way makes communications difficult.**
- **Not all areas of the mine receive emergency signal.**

### 5.9.3 Evidence from Documentation

#### a) Training/Assessment Documentation

Training & Assessment Documentation was collected from BMA Blackwater Mine, Ergon Energy and Workplace, Health and Safety.

**Christopher Belfield** held the following Workplace, Health and Safety Certificates.

- |   |                   |
|---|-------------------|
| <input type="checkbox"/> WP Work Platform   | - Issued 2/12/00  |
| <input type="checkbox"/> LB Backhoe Front End Loader                                | - Issued 26/09/00 |
| <input type="checkbox"/> LL Front End Loader  | - Issued 26/09/00 |
| <input type="checkbox"/> LS Skid Steer Loader                                       | - Issued 26/09/00 |
| <input type="checkbox"/> LF Fork Lift Truck – not pedestrian operated               | - Issued 1/04/98  |
| <input type="checkbox"/> DG Dogger  | - Issued 8/03/02  |
| <input type="checkbox"/> C2 Slewing Mobile Crane with capacity of 20 tonnes or less | - Issued 9/04/02  |

**No training records on the VLC for Chris Belfield were available from Ergon Energy.**

Chris Belfield had been assessed for a CV Vehicle Loading Crane greater than 10 metre/tonnes (Appendix 9) on the 27/11/01 but was never issued with a certificate due to a delay in submitting the application and assessment material to Workplace, Health and Safety (WH&S). If the application and assessment material are not submitted to WH&S within sixty days of the assessment being completed, than another application must be submitted along with a request for Recognition of Current Competency (RCC). This process was never completed. Once the Form 'Prescribed Occupation Application/Assessment Report' has been completed by the Accredited provider, then the applicant is deemed competent to operate that equipment for sixty days while awaiting the issuing of the OHS Certificate.

The assessment for the C2 Slewing Mobile Crane with capacity of 20 tonnes or less (Appendix 10), was conducted on the 4/04/02. Under WH&S Certification, the C2 Certification encompasses the CV Vehicle Loading Crane (Appendix 11). This meant that Chris Belfield had been assessed twice and deemed competent to operate cranes of larger capacity than the HMF 622-K2-B2, by an accredited provider (John Buchanan – Registration No. 42560) within a six month period leading up to the accident.

A copy of Chris Belfield's CV Vehicle Loading Crane assessment (Appendix 12) was obtained from John Buchanan through Ergon Energy. The comparison between this assessment document and the OHS Certificate of Competency National Assessment Instrument for a Vehicle Loading Crane (Appendix 13) was made by Mr Greg Rowan, Senior Inspector of Mines and Mr Robert Clark, Inspection Officer, both of whom are holders of Certificate IV Trainer/Assessor qualifications. It was concluded that the questions and answers in the assessment document did not cover every performance criteria element of the National Assessment Instrument.

The Training Scheme as prescribed in the Coal Mining Safety and Health Regulation 2001 states the following:

*82.(1) A coal mine's safety and health management system must provide for a training scheme for persons at a mine.*

*(2) The scheme must include provision for the following—*

- (a) induction training for coal mine workers and other persons at the mine;*
- (b) refresher training for coal mine workers;*
- (c) establishing the workers' training needs about the safe performance of the mine's coal mining operations, including, for example, training needs about the mine's standard operating procedures;*
- (d) recognising a worker's current competencies and prior learning in establishing the worker's training needs;*
- (e) establishing a training program to meet the training needs using the endorsed components of the coal industry training package that are relevant for training and assessing the mine's coal mine workers;*

- (f) *appointing persons who are competent to give the training and assess the workers' competencies;*
- (g) *keeping and auditing records of training and assessment given and undertaken;*
- (h) *designating tasks that may only be carried out by a worker who has been assessed as competent to carry out the tasks;*
- (i) *training workers elected to be safety and health representatives.*

(3) *The training scheme must cover the following matters, to the extent the matters are relevant to the duties of the person undergoing the training—*

- (a) *the mine's safety and health management system;*
- (b) *operating mobile plant;*
- (c) *slinging and moving loads and using lifting devices;*
- (d) *manual handling;*
- (e) *the purpose of inspections and inspection reports.*

(4) *In this section—*

*“coal industry training package” means the coal industry training package established by the Australian National Training Authority.*

*“endorsed” means endorsed by the Australian National Training Authority.*

**BMA Blackwater Mine has a Training Scheme – Procedure No: QC-PQC160-00, Issue No: 1, Dated 25/5/01 which meets the requirements of section 82, and states in:**

***Section 5.6.6 Authorisation to operate on the mine site***

- *Authorisation for personnel to operate fixed and mobile equipment shall be the responsibility of the SSE or his designated representative as documented in the mine management structure.*

***Section 5.11 Temporary Employees / Contractors***

***All temporary employees shall, before commencing work on the mine site, supply documentary proof that:***

- ***Competencies held have been validated and authorised in compliance with the Coal Competencies. It is the responsibility of the Principal Contractor to ensure that all documentation is complete and submitted to the SSE.***

*Validation shall provide proof that demonstrates the person has been trained and assessed in accordance with the Coal Competencies or an approved RCC/RPL process.*

- Authorisation shall include discrimination between models of equipment, current competency to operate to the same standard as permanent employees on BHP mine sites.*
- Temporary employees / contractors training records shall be recorded electronically on the enterprise database.*

#### **Section 5.14 Crane, Hoist and Basic Lifting**

*Training associated with cranes and hoists shall comply with the Coal Competency Standards and Coal Mining Safety and Health Act. This training will usually be in the form of vendor training by a qualified outside organisation.*

*Equipment examples may include but not limited to:*

- Slew Crane*
- Man Box*
- Non-Slew Cranes*
- Gantry Cranes*
- Forklifts*
- Manhoists (E.W.P., Scissor lift etc)*

*NOTE: Basic lifting and slinging training conducted and assessed to Coal Competency Standards shall be a prerequisite to any of the above.*

**It is a requirement of the BMA Blackwater Mine's Training Scheme - Section 5.11, that temporary employees / contractors supply documentary proof that the competencies they hold have been as a result of being trained and assessed in accordance with the Coal Competencies. The BMA Blackwater Mine Training Scheme is found in Appendix 15**

**No documentary evidence could be provided by BMA Blackwater Mine to prove that the Ergon Energy employees had been trained and assessed to the Coal Competencies. What was accepted by the BMA Blackwater Mine in relation to the VLC was:**

- A copy of the Prescribed Occupation Application / Assessment Report completed by the Accredited provider for a VLC more than 10 metre/tonnes.**

**On the 3/4/02, Mr Geoff Williams supplied BMA Blackwater Mine with a BM Alliance Coal Operations Pty Ltd Form PD-FSAF006 (Contractor/Equipment Authorisation) for each Ergon Energy employee working on site, including Chris Belfield. The following is stated at the top of this form.**

“I advise that *NAME OF EMPLOYEE* is an experienced operator possessing the attached external licences and is competent to operate the items of equipment or carry out the tasks listed below. Where external authority licences are not held I certify that this operator has been trained and tested on that item of equipment to a competent standard.”

Chris Belfield’s form only indicated two items of equipment

- Item 5. Truck – Non-Articulated - Licence No 11110977
- Item 20. Elevating Work Platform ; - Licence No 01560976

Item 23. Crane – Hiab was not indicated.

Printed at the top of these forms is “TO: Peak Downs Mine Department Manager” and the forms are signed and dated photocopies with the other information newly entered. Photocopies of Chris Belfield’s form were provided by both BMA Blackwater Mine (Appendix 16) and Ergon Energy (Appendix 17), with the copy from BMA Blackwater Mine having an additional Licence No. added alongside Item 23. Crane – Hiab (Q778035). The original Form for Chris Belfield could not be found by management and was assumed lost although the originals were available for the other employees. Mr Ray Delaforce, Contracts Supervisor, admits to having added the additional Licence number but cannot remember when.

BMA Blackwater Mine have another Form QC-FSAF005 titled **BMA Contractor Employee Authorisation** and **Dated: 5/10/2001**, which is a replacement for **PD-FSAF006** but had never been used prior to the accident. (Appendix 18)

### Authorisation

The following is stated in the BMA Blackwater Training Scheme.

#### *Section 5.6.6 Authorisation to operate on the mine site*

- Authorisation for personnel to operate fixed and mobile equipment shall be the responsibility of the SSE or his designated representative as documented in the mine management structure.*

*On the 19/3/02, Chris Belfield completed the assessment and other details that were required under the Blackwater Mine – Contractor/Visitor Induction Permit Checklist.*

*Section 4 of the Checklist Authorisation – Operate equipment and/or perform specific duties, states:-*

*“The named Contractor states that the following certificates/licences are bonafide. These have been sighted by the inductor and are required for the work to be performed.*

<i>Certificate/Licence Type</i>	<i>Number</i>	<i>Expiry Date</i>
---------------------------------	---------------	--------------------

*As per attached copies.*

- Photocopy of all relevant tickets/certificates.”*

*Section 5 Authorisation – Registered Mine Manager, has been signed by Paul Hensley, Contracts Co-ordinator, who was appointed on the 14/9/01 by the Site Senior Executive to do so, as his designated representative.* (Appendix 19)

Additional to the above authorisation, Paul Hensley issued a letter on the 19/3/02, which states:

***Blackwater Coal Mine***

***Coal Mining Safety and Health Regulation 2001***

*Under Section 85(2) of the Coal Mining Safety and Health Regulation, you have been assessed as competent and are hereby authorised to carry out the following tasks:*

*Forklift  
Elevated Work Platform  
Backhoe Front End Loader  
Front End Loader  
Skid Steer Loader  
Digger  
Medium Vehicle(line through this) OK PH 19/3/02  
Ozzy Crane (Hiab)*

*Signed Paul Hensley.*

*(Appendix 20)*

**Ozzy Crane assessment was conducted on the 4/4/02. There is no evidence of an authorisation for Chris Belfield to operate the VLC prior to the 19/3/02.**

BMA Blackwater Mine had an Operator Training / Assessment Package for the operations of a FASSI Vehicle Loading Crane developed by IML International Pty Ltd to the Black Coal Competencies (MNCG 62, MNCG 50, MNCG 63). This was developed in August 2001. Under the section **SAFETY NORMS - To operate the crane'** point 18 states – **Avoid swinging the load above the control station. In cases where the load is too close, the crane must be operated from the opposite side.** (Appendix 21)

**Chris Belfield's competency to operate the vehicle loading crane was not assessed against this Operator Training Package before operating on the minesite.**

**Black Coal Competencies**

The Black Coal Competency Unit for Operating Vehicle Loading Crane is MNC.G 50.A. Point 1 in the Range of Variables states – **Australian Standard AS2550, vehicles and State based Legislation and Regulations must be consulted and applied.** Also, G50.2.2 of the Performance Criteria for Operate Vehicle Loading Crane, states- **Pre-start, start-up, park-up and shutdown procedures are carried out in accordance with Australian Standards and manufacturer's instructions and site procedures**

**Australian Standard AS2550.1 – 1993**

**Cranes-Safe use**

**Part 1: General requirements**

**4.5 Clearances**

***When setting up a crane, the clearance for persons between moving parts of the crane and fixed***

*structures or other natural or built objects shall be as follows:*

- (a) Clear width not less than 500 mm.*
- (b) Vertical clearance not less than 2000 mm.*

*Where these clearances cannot be maintained, then suitable provisions shall be made to exclude persons from any potential trapping spaces.*

## **7.2 Pre-operation Checks**

*Before commencing operations, the crane operator or other authorised person shall carry out routine checks in accordance with the operating instructions which shall be sufficient to ensure the safe operation of the crane.*

*Before placing a crane in service, the crane operator shall review the logbook and be satisfied about-*

- (b) the safe working condition of the crane;*
- (c) the safe operation of each motion of the crane*

## **7.9 Crane Operation**

### **7.9.1 General**

*When operating a crane, the crane operator shall-*

- (e) not move the hook or load when the hook or load is out of sight except where directed to do so by an authorised person such as a dogman, crane chaser or rigger;*
- (k) when loads have to be handled in the vicinity of persons, be alert to the possibility of persons being trapped and injured by the movement of the crane or load and exercise due caution. Where the person controlling the load or others may be trapped, do not move the crane or load unless their safety is assured.*

## **Section 8 Maintenance, Inspection and Repair**

### **8.1 General**

*A logbook (record) shall be kept of all cranes. The logbook shall be readily available for the crane.*

### **8.2 Inspection**

*Each crane shall be inspected periodically in accordance with management's instructions and with full consideration of the crane duties, to ensure that-*

- (a) the parts of the crane subject to deterioration through corrosion, damage, wear, abrasion and like effects are replaced before they become unserviceable; and*
- (b) the crane is maintained in a safe, serviceable condition.*

**b) Personnel**

Chris Belfield

Chris Belfield commenced employment with Ergon Energy on the 9/5/00 and was part way through a 12 month term contract which commenced on the 7<sup>th</sup> January 2002. He was considered by his fellow workers as a safety conscious person who actively involved himself in job safety.

Ergon Energy had given him extensive training in the core skills required to competently fulfil the statutory and safety requirements of working in the electrical distribution industry. He also held certificates issued by the Workplace, Health and Safety in various skills listed in 5.9.3 a). He was considered by his Team Leader a competent operator of equipment especially the vehicle loading crane.

He had completed a Qld Mining Industry induction on the 4<sup>th</sup> May 2001 and had been issued with a Generic Induction Passport No 31688. During the same period, he completed the BHP SGS Qld Induction and received his Site Access Card. As part of the Coal Industry Employees' Health Scheme, he completed a pre-employment health assessment on the 6<sup>th</sup> July 2001 and was deemed fit for the proposed position. All evidence indicates that he was healthy at the time of the accident.

**c) Other Documentation**

- 1) Instruction Manual for the HMF – Handy 620 Series of cranes including the 622-K2-B2, states under the section titled “**IMPORTANT**” - **Presence under the working loader is not permitted.** (Appendix 22)
- 2) **In the Instruction Manual, Section 8.1– Dimension Sketch, shows that the HMF 622-K2-B2 could slew 365°, allowing a 5° overlap in either direction. The crane’s orientation on the rear of the truck meant the points where the crane could not slew any further, in either direction, were above the tray of the truck. As a result of this, a person operating the crane from the passenger’s side controls and wanting to load or unload an item on that same side, after firstly unfolding the crane, would have to slew the crane over himself to reach the passenger’s side of the truck. A video recording of the slew operations of the vehicle loading crane was taken by Sergeant P Burke in Townsville on the 27<sup>th</sup> May 02 and can be found in Appendix 31.**
- 3) **A drawing and photograph used on the covers of the HMF – Handy 620 Instruction Manual show the operators at the controls on the same side as the loader is being operated and in the case of the photograph, located under the boom.** (Appendix 22)
- 4) **Capelec Report: PC45BR05 – Crane / Borer Vehicle Maintenance Checks and Services, has listed a number of checks that are required to be carried out on the Crane /Borer by the driver / custodian of the unit, as part of a Daily Inspection. The final dot point states –**

**Note**

- **Record check on Capelec Inspection Record PC45BM01 and note any defects in the Machinery Maintenance Logbook.** (Appendix 23)

**The PC45BM01 as noted above is a typing error on the form and should have read PC45BM04. As explained in 5.9.1 b) 1), three PC45BR03 forms were found in the Mitsubishi FK 457 truck but no PC45BR05 Forms and there was no evidence found that daily inspections of the VLC**



had been carried out during 2002. Also, the broken lever on the driver's side controls hadn't been recorded in the logbook as required.

#### 5) Truck Loading Crane Inspections

These were carried out on an annual basis by Mains Roads, Plant Hire Services, Rockhampton Workshop. The last inspection was completed on the 9/11/01 when all items were ticked in the O.K. column.

(Appendix 24)

#### 6) Drug and Alcohol Testing

Chris Belfield was last tested on the 26/3/02 and passed.

#### 7) Risk assessments – Hazard I.D.

A risk assessment was carried out by the Ergon team on the morning of the 12/4/02, on the task of '6.6KV lines – Ramp 48 & Kenmare'. Risk assessments were carried out each day by the Ergon team on the activities for that day.

(Appendix 26)

#### 8) Audits

Audits of the Ergon Energy teams activities were carried out by BMA Blackwater Mine management, on a weekly basis. These audits were based on the Ergon team's activities being observed and those observations whether safe or unsafe being recorded and categorised.

(Appendix 27)

#### List of Categories

(PPE)	Personal Protective Equipment
(PP)	<b>Positions of People</b>
(ERG)	Ergonomics
(TE)	Tools and Equipment
(PRO)	Procedures
(HOU)	Housekeeping

These audits never identified the position of people whilst operating the VLC, as a hazard.

#### 5.9.4 Emergency Response

Once the emergency had been raised, the response was quick and well co-ordinated. Three ambulances from various locations attended the accident scene as well as a number of the mines rescue members. Two electrical tradespersons who were passing the area at the time of the accident were the first on the scene and assisted in administering first aid and CPR. On arrival at the scene, the mines rescue members assisted with the CPR and secured the area. The actions, by all the people involved, were carried out professionally and expeditiously. The Blackwater Police and doctor attended the scene and followed the ambulance transporting Mr Belfield to the hospital.

Concerns were raised by members of the mines rescue about the emergency signal on the two-way radio system and how it made communications difficult. Also some areas of the mine are on a different frequency and do not receive the emergency signal. There was also a complaint

**about vehicles not pulling off the back access road when the emergency services vehicles were approaching.**

## **Part 4**

### **5.10 ANALYSIS OF EVIDENCE**

#### **5.10.1 ICAM Analysis**

A BHP systematic safety investigation analysis method called Incident, Cause, Analysis, Method (ICAM) was used to identify local factors and failures within the broader organisation and productive system (e.g. communication, training, operating procedures, incompatible goals, organisational culture, equipment, etc.) which contributed to the accident. Through the analysis of this information, ICAM provides the ability to identify what really went wrong and to prevent recurrence. This method was used to present the accident findings in terms of:

- a) **Absent or Failed Defences** – These failures result from inadequate or absent defences that failed to detect and protect the system against technical and human failures. These are the last minute measures which did not prevent the outcome or mitigate the consequences of an individual or team action that resulted in an incident or near miss.
1. Hazard of operating the vehicle loading crane over the operator was not identified.
  2. Vehicle loading crane was not operated from the non-loading side controls.
  3. Lack of knowledge by operators on the hazards associated with operating the crane on the same side as the controls being used.
  4. Training/assessment material didn't address adequately the hazards associated with operating the crane on the same side as the controls being used.
  5. Work area around control levers was restricted.
  6. Absence of crane slew limits around the area of the control panel.
- b) **Identify the Individual/Team Actions** – These are the errors or violations that led directly to the incident. They are typically associated with personnel having direct contact with the equipment, such as operators and maintenance personnel. They are always committed 'actively' (someone did or didn't do something) and have a direct relation with the incident. Human error types are slips, lapses, mistakes and violations.
1. Chris Belfield manoeuvred the vehicle loading crane above his location at the controls.
  2. Chris Belfield operated the control lever for the jib.
  3. Chris Belfield operated the vehicle loading crane from the same side as the bed log was unloaded.
  4. Chris Belfield was not watching jib at the time of operating the controls.
  5. Chris Belfield and Brian Kelly did not operate together as crane operator and dogman allowing operation from driver's side controls.
  6. Teams conducting audits did not identify hazard.
  7. Ergon Energy management did not conduct risk assessment on the operation of the vehicle loading crane.
  8. Ergon management did not provide adequate training.
  9. Ergon Energy team members did not immediately remove the hydraulic pressure from the vehicle loading crane.

c) **Identify the Task/Environmental Conditions** – These are the conditions in existence immediately prior to or at the same time as the incident. These are the conditions that directly influence human and equipment performance in the workplace. These are the circumstances under which the errors and violations took place and can be embedded in task demands, the work environment, individual capabilities and human factors.

1. Jib control lever on the driver's side had a broken pivot casting.
2. Bed log placed on the ground within slew angle of the controls.
3. Vehicle loading crane could not slew across the tray of the truck.
4. Generic design of vehicle loading crane in having two sets of controls
5. Reliance on undocumented knowledge
6. Chris Belfield was working his 11<sup>th</sup> consecutive shift
7. Photocopied pages of the HMF – Handy 620 Crane Instruction Manual had missing page on “Important” items.
8. Only operational training on the vehicle loading crane provided by Ergon Energy.
9. Hazard of working under jib and boom of vehicle loading crane not identified.
10. Possible distraction of operator.
11. Inadequate knowledge of the hazards of operating vehicle loading crane.
12. Orientation of vehicle loading crane confined operators working area at controls.
13. Operator predominantly left handed.
14. Functions of the jib control lever were opposite to the boom control lever.
15. No safe working procedures for the use of the vehicle loading crane available on the job for the Ergon Energy team to use.
16. Design of the crane allowed rapid movement of the jib at the end of the ram stroke.

d) **Identify the Organisational Factors** – These are the underlying organisational factors that produce the conditions that affect performance in the workplace. They may lie dormant or undetected for a long time within an organisation and the repercussions may only become apparent when they combine with the local conditions and errors or violations to breach the system's defences. These may include fallible management decisions, processes and practices.

**Organisational Factor types**

HW	Hardware
TR	Training
OR	Organisation
CO	Communication
IG	Incompatible Goals
PR	Procedures
MM	Maintenance Management
DE	Design
RM	Risk Management
MC	Management of Change
CM	Contractor Management

1. TR – Ergon Energy provided inadequate training on VLC – no formal training program, no standard used, no records kept and no training materials supplied.
2. TR – BMA Blackwater Mine did not ensure training/assessment was to the Coal Competencies
3. OR – BMA Blackwater Mine did not follow the requirements of the Training Scheme.

4. OR – BMA Blackwater Mine audits didn't identify hazards associated with the operations of the vehicle loading crane.
5. OR – Ergon Energy did not train team leader in responsibilities (check that inspections were being carried out).
6. OR – Ergon Energy did not enforce own procedures.
7. PR – Ergon Energy did not develop safe working procedures for the use of the vehicle loading crane.
8. PR - Ergon Energy failed to use Fatigue management.
9. MM- Ergon Energy failed to supply employees with the correct inspection forms for cranes. (PC45BR05)
10. DE - No risk assessment conducted when orientation of the crane was rotated 180° on the rear of the truck.(Ergon Energy)
11. DE - Design of crane allows jib and boom to be slewed over the location of the operator.
12. RM - Ergon Energy did not conduct risk assessment on the use of the vehicle loading crane.

Refer to Appendix 28

## 6.0 CONCLUSIONS AND OBSERVATIONS

### 6.1 NATURE OF ACCIDENT

The investigation found that Christopher Belfield died from extensive injuries to the upper body as a direct result of being crushed at great force (in excess of 1 tonne as detailed in the Engineering Report – Appendix 4) against the passenger's side control panel of the vehicle loading crane (HMF 622-K2-B2), by the extended jib of the crane.

### 6.2 CAUSE OF ACCIDENT

The Engineering Investigation of the vehicle loading crane conducted by Mr John Smith, District Inspector of Mines (Mechanical), and Mr Bruce McKinnon, Inspection Officer, both from the Department of Natural Resources and Mines and Mr Wayne Irving, National Business Development Manager, Cranes RED AUSTRALIA, contracted by BMA Blackwater Mine, found no defects with the operational functions of the crane. As there were no eyewitnesses to the accident and no evidence that indicated another cause, it is apparent that Chris Belfield has inadvertently pushed down the jib raise/lower control lever causing the jib to close in on him.

Why this occurred remains unclear, as there were no eyewitnesses and no conclusive evidence to support any definite cause. From the statements, it was found that Kerrod Smith, Team Leader, was the last person to sight Chris Belfield prior to the accident, when Chris Belfield waved to him as he was driving into the laydown area. At that time, the bed log was on the ground and detached from the crane and Chris Belfield was standing between the log and the truck facing the access road. Kerrod Smith had no sooner parked his vehicle when the alarm was raised by Brian Kelly.

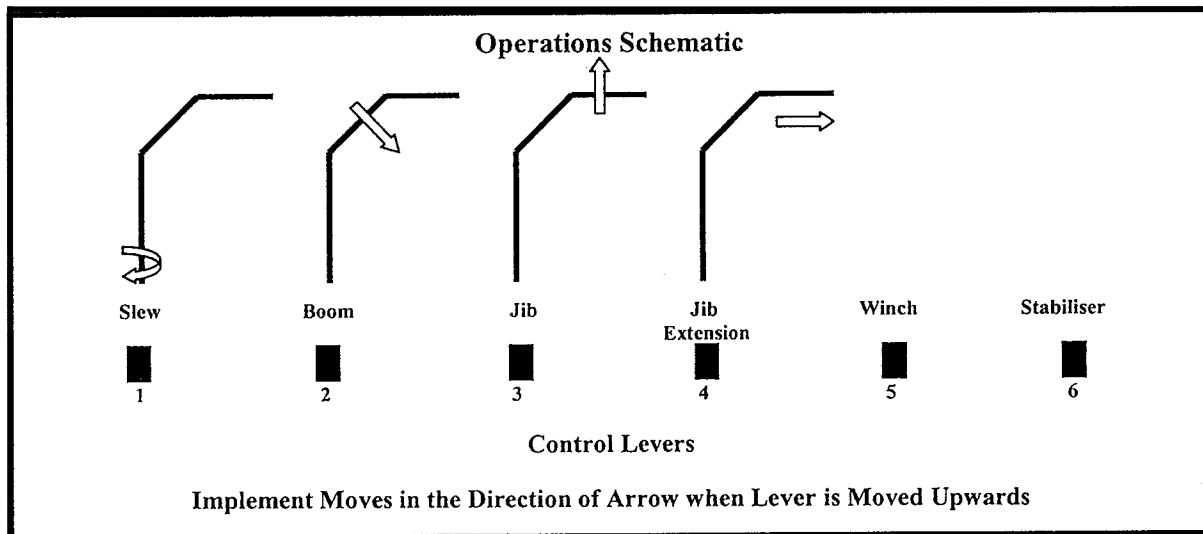
What movement Chris Belfield planned to make with the crane next is unknown. In his statement, Brian Kelly said Chris Belfield hadn't discussed with him which side he was planning to remove the module from the truck. Because of its orientation, the crane could not be slewed across the tray of the truck, and depending on which side Chris Belfield planned to remove the module, dictated what crane movements were required next.

**One scenario**, raised by the BMA Blackwater Mine Investigation Team, was that Chris Belfield intended to retract the jib extension, which as can be seen from the Operations Schematic - Figure 1, would have required control lever 4 to be pushed downwards. If instead, he has inadvertently pushed control lever 3 down, this would have caused the jib to lower onto him.

A **second scenario** was that, if he had intended to remove the module from the passenger's side of the truck, then the jib length as it was, may have been suitable and he may have intended to raise the boom, which would require control lever 2 being pushed downwards but as in the first scenario he has inadvertently pushed control lever 3.

A **third scenario** could be that Chris Belfield was momentarily distracted by the arrival of Kerrod Smith and Daniel Fitzpatrick in their vehicles and has inadvertently pushed the wrong lever.

As previously mentioned, no conclusive evidence to support any of these scenarios was found and it can only be deduced that Chris Belfield has made a error resulting in the unintentional action of pushing the jib control lever in a downwards direction. The basic error type could have been a slip in concentration or the mistake of operating the wrong control lever.



**Figure 1**

## 6.3 CONTRIBUTING FACTORS

### 6.3.1 Training and Competency

The competencies required to operate a vehicle loading crane on a mine site differ from those required in other industries.

Under Section 82 of the Coal Mining Safety and Health Regulation 2001, the coal mine's safety and health management system must provide for a training scheme for persons at a mine. Section 82 (2) states – The scheme must include provision for the following-

- (e) establishing a training program to meet the training needs using the endorsed components of the **coal industry training package** that are relevant for training and assessing the mine's coal mine workers;

- (h) designating tasks that may only be carried out by a worker who has been assessed as competent to carry out the tasks

As part of the coal industry training package, there is a **Black Coal Competency Unit: MNC.G50.A – Operate Vehicle Loading Crane** which covers the lifting and positioning of loads using a vehicle loading crane. This competency covers all vehicle loading cranes regardless of the size.

Other industries are covered by Workplace, Health and Safety who have a Guide for Vehicle Loading Cranes with a capacity less than 10 metre/tonnes but only issue a Certificate of Competency CV for vehicle loading cranes with a capacity greater than 10 metre/tonnes.

As the HMF 622-K2-B2 vehicle loading crane had a capacity of 6 metre/tonnes, it was not a requirement to be assessed and certified competent, to operate it off a mine site. However, on a mine site, it is a requirement for all persons operating vehicle loading cranes to be trained and assessed competent with the MNC.G50.A. Black Coal Competency.

Chris Belfield began operating the HMF 622-K2-B2 vehicle loading crane in June/July 2001 and received operational training from both Steve Cowley, Ergon Energy Team Leader at the time, and to a lesser extent Graham Bedford, another Ergon Energy employee. Neither Steve Cowley nor Graham Bedford held certificates of competency in the operation of vehicle loading cranes. **The training was ad hoc, with no set program or standard of competency used and no training materials issued to the trainees.** Chris Belfield, along with Kerrod Smith and Brian Kelly, were assessed on the 27<sup>th</sup> November, 2001, by John Buchanan, an Accredited provider, and deemed competent to operate a vehicle loading crane greater than 10 metre/tonnes. The assessment tool used by John Buchanan for Chris Belfield's assessment and the standard of Chris Belfield's answers did not fully meet the OHS Certificates of Competency National Assessment Instrument for a Vehicle Loading Crane as required by Workplace, Health and Safety.

On the 4<sup>th</sup> April 2002, Chris Belfield was assessed for a C2 Slewing Mobile Crane with a capacity of 20 tonnes or less, again by John Buchanan, and deemed competent. Under Workplace, Health and Safety Certification, the C2 Certification encompasses the CV Vehicle Loading Crane. This meant that **Chris Belfield had been assessed twice and deemed competent to operate cranes larger than the HMF 622-K2-B2 within a six month period prior to the accident.**

Although the BMA Blackwater Mine's Training Scheme states in Section 5.11 Temporary Employees / Contractors, that documentary proof that 'Competencies held have been validated and authorised in compliance with the Coal Competencies' and 'Validation shall provide proof that demonstrates the person has been trained and assessed in accordance with the Coal Competencies', management failed to comply with this section and in doing so breached the legislation.

As it was determined that the most likely cause for the accident was the inadvertent operation of the jib control lever by Chris Belfield, then the assessment of Chris Belfield's competency in the operation of the control levers on the crane needed to be determined. With the evidence that Chris Belfield had been operating the same vehicle loading crane on a regular basis for approximately 10 months without incident, and was considered very competent in the use of the crane by his work mates, and had been assessed competent in the use of the controls by an Accredited provider, it would appear that he was competent in that aspect of its operation.

### 6.3.2 Restricted Work Area

The working area around the controls of the crane on both sides of the truck was very restrictive and allowed no escape route from the area in the case of a hazardous situation. After the Mitsubishi FK 457 truck fitted with the HMF 622-K2-B2 crane, went into service, the orientation of the crane was changed by rotating it 180° so that the crane could be slewed around the back of the truck rather than over the tray. What this did was relocate the stabilisers from being flush with the rear of the truck and between the operator and the load in normal operations of unloading or loading the truck, to behind the operator restricting his work area. In the original configuration, the operators work area to operate the controls wasn't so restrictive. This change was made without assessing the risks or hazards that may have been introduced through the new configuration. In the original configuration, the stabiliser would have guarded the operator from being crushed by the jib in this accident.

### 6.3.3 Position of Operator

The vehicle loading crane was designed to improve manual handling and allow a truck operator to load and unload items without assistance. To be able to view an item being placed safely on the ground, an operator is compelled to operate the crane from the controls on the same side as this task is being undertaken. It is an accepted practice that operators of vehicle loading cranes operate from the same side that the crane is being used and this is endorsed through photographs and drawings in manufacturers' instruction manuals and training literature. (Appendix 22)

Although the HMF Handy 620 Crane Instruction Manual states:

- **"IMPORTANT" - Presence under the working loader is not permitted; and**
- **'Whenever possible, the loader should be operated from opposite side from where the load is suspended in order to avoid personal injuries in case of accident',**

for small items, Ergon Energy employees continued to operate the crane from the same side as the crane was being used. **The absence of a structured training program, and training material may have contributed to why operators positioned themselves where they did.** Also with the configuration of this crane, **the operator had to use the passenger's side controls to unfold the crane from its transport position, as the jib and boom unfold on the driver's side.** If Chris Belfield's intention was to unload the module from the truck to the driver's side, then his position at the passenger's side control panel suited most tasks apart from the unloading of the bed log.

During the initial inspection of the accident scene, **it was found that the jib raise/lower control lever on the driver's side had a broken pivot casting,** making it impossible to lower the jib using this control panel. From the investigation, no evidence could be uncovered as to how long this lever had been broken and whether anyone was aware of it. **As the daily inspections were not being recorded and there were no new entries made in the vehicle maintenance book, it could not be determined whether Chris Belfield was aware of the broken lever or not, or whether it had any influence on his decision to use the passenger's side control panel to unload the bed log.**

**With both Chris Belfield and Brian Kelly being certified doggers, Chris Belfield could have operated the crane from the driver's side controls allowing Brian Kelly to give him directions on crane movements from the tray of the truck.**

### 6.3.4 Orientation of the Vehicle Loading Crane

As the vehicle loading crane is capable of slewing 365°, this means that there is a limit in both directions as to the extent to which the crane can be slewed. In the original configuration, this area was at the rear of the truck, but since being rotated, the slew limits have moved to the middle of the tray. The re-orientation of the crane has created additional hazards for the operator in that to slew the crane from one side of the truck to the other side requires the jib and boom to be slewed over the operator at the controls. Had a risk assessment been conducted when the idea of changing the orientation of the crane was initially raised, the operational hazards would have surely been identified and controls introduced to manage them. **No risk assessments were ever conducted by Ergon Energy on the operations of the crane in either configuration.**

### 6.3.5 Design of the HMF 622-K2-B2 Vehicle Loading Crane.

The HMF 622-K2-B2 vehicle loading crane has been designed to be fitted in various configurations to a range of vehicles. As part of the design, control levers have been installed so that the crane can be operated from either side of the vehicle. This has been achieved by having a hydraulic valve bank located on one side with its own set of levers that are linked by connecting rods to another set of levers on the other side. The configuration and connection of the levers on both sides is such that the operation of a function on one side is identical to that on the other. However the order of the functions is a mirror image from one side to the other. When Chris Belfield was forced into the control levers on the passenger's side, the levers were pushed down and to the side, causing some of the functions to be engaged, one being the downward movement of the jib. At the same time, it prevented the use of the control levers on the driver's side because of the mechanical connection between the levers.

Other design issues are:

- a) **There are no engineering controls incorporated in the design to prevent the crane from being slewed across the control panel where a person operating the crane is located.** There is also no protection for the operator in the event of a malfunction.
- b) The control levers on the driver's side do not have a guard or shroud above the levers to prevent an item from falling onto them.
- c) The functions of the boom and jib controls introduce another hazard in that the direction of movement of the equipment for each function is the reverse of the other. ie for the boom to lower, it requires the control lever to be pushed upwards while for the jib to lower it requires the control lever to be pushed downwards and visa versa in the other direction. For safety reasons, both the boom and jib should raise when the control levers are pushed down so that if inadvertently operated by a person or by something falling onto them, the crane will open rather than close. Also it makes the operations of the control levers less confusing and hazardous for the operator.
- d) The geometry and configuration of the jib ram or hydraulic circuit to this function need to be modified to remove the acceleration of the jib when it passes the centre of the pivot between the jib and boom.
- e) There were no deadman controls incorporated in the design that would stop all operations in the event of an accident or absence of the operator from the controls.



### 6.3.6 Audits

Generally, on a weekly basis, audits were conducted by the BMA Blackwater Mine on the Ergon Energy activities and although one of the categories to be observed in the audit was the **Position of People**, the position of the vehicle loading crane operator was never identified as a hazard.

### 6.3.7 Fitness for Duty

Although Chris Belfield had worked for 10 days straight prior to the accident, there was no evidence that impairment was a contributing factor in the accident. On the four days leading up to the accident, Chris Belfield worked 8 hr shifts in the Rockhampton workshop while repairs were carried out on the International Acco truck. On the evening of the 11<sup>th</sup> April 2002, after completing work at the workshop, he then drove the truck to Blackwater and had approximately 7hrs sleep that night. Evidence gathered from statements indicated he appeared alert with no signs of fatigue on the morning of the accident.

Chris Belfield had a drug and alcohol test on the 26<sup>th</sup> March 2002, which he passed.

### 6.3.8 Risk Management

As previously mentioned, Ergon Energy had not conducted any risk assessments on the operations of the vehicle loading crane. BMA Blackwater Mine also had not conducted any risk assessments on the operations of the HMF 622-K2-B2 vehicle loading crane or the other vehicle loading cranes on site.

### 6.3.9 Systems Observations

#### 6.3.9.1 BMA Blackwater Mine – Contractor Management

- It was found from the evidence that the requirements of the Training Scheme had not been adhered to with regards the Ergon Energy employees. Training and assessments weren't to the Black Coal Competencies. Ergon Energy employees had been operating the vehicle loading crane on site prior to the 27<sup>th</sup> November 2001 without authorisation.
- The authorisation letters of the 19<sup>th</sup> March 2002 signed by Paul Hensley, did not describe the equipment clearly ie Ozzy Crane (Hiab). Does this refer to the vehicle loading crane or Ozzy Crane Borer. On the 19<sup>th</sup> March 2002, the Ergon Energy employees had not been trained or assessed to operate the Ozzy Crane Borer.
- The Contractor/Equipment Authorisation form accepted from Ergon Energy was a photocopy of a Peak Downs form PD-FSAF006 03. It was not insisted that the correct form QC-FSAF005 be used. At some time close to the date of the accident, the Application/Assessment form number for Chris Belfield's vehicle loading crane assessment conducted by John Buchanan was placed on his PD-FSAF006 03 form by Ray Delaforce, Contracts Supervisor, and the original form lost.
- The daily inspections of the crane and log book entries were not audited.

### 6.3.9.2 Ergon Energy

- No evidence of training on the vehicle loading crane for their employees. No evidence of competency for the operation of the vehicle loading crane prior to the 27<sup>th</sup> November 2001.
- Didn't enforce the Company procedures for daily inspections, and log books.
- Incorrect daily maintenance sheets supplied in truck.
- Team leader not trained in his responsibilities. Supervisors didn't check that the daily inspections were being carried out and defects reported.

## 6.4 REMEDIAL ACTIONS

The following immediate actions were taken by the BMA Blackwater Mine and followed soon after by all BMA Coal Operations.

- All vehicle mounted loading cranes on site including those of contractors were removed from service until a full risk assessment was completed, focussing in depth, on the potential for crush and other injuries. This also included non-traditional applications such as vehicle loading cranes mounted on drills and rock breakers.
- The risk assessment was not solely to focus on the vehicle loading crane. It was to include items such as:
  - Design of vehicle
  - Vision for operator
  - Man/machine interface
  - Layout of crane
- Designate and identify no-go zones when operating vehicle loading cranes.
- Upgrade training and assessment materials to identify critical aspects of operation:
  - Pictures and descriptions of the no-go zones.
  - Importance of watching the hook.
  - Importance of not working under the boom.
  - Emphasising the risk from poor or haphazard operating practice and short cuts.
- Advise the work force of the BMA Blackwater Mine and industry groups of the preliminary findings.
- All contractor's vehicle loading cranes to meet the BMA standards and or provide suitable risk assessments and procedures.

Other coal operators were informed through information disseminated by the Queensland Mining Council on the initial findings supplied by BMA Blackwater Mine.

Ergon Energy similarly removed all vehicle loading cranes from service and informed all suppliers of the incident.

A Safety Alert on the incident was disseminated to the coal mining industry.

## 6.5 LEGISLATIVE ISSUES

- a) Training Scheme – Section 82 of the Coal Mining Safety and Health Regulation 2001.

The coal mine's safety and health management system must provide for a training scheme for persons at the mine.

It is the obligation of the site senior executive, Section 42 of the Coal Mining Safety and Health Act 1999:

- a) To ensure the risk to persons from coal mining operations is at an acceptable level;
- b) To ensure the risk to persons from any plant or substance provided by the site senior executive for the performance of work by someone other than the site senior executive's coal mine workers is at an acceptable level;
- c) To develop and implement a safety and health management system for the mine;

From the evidence gathered from the statements and documentation, it was determined that Chris Belfield was trained in the operations of the vehicle loading crane on the mine site by other Ergon Energy employees who were **not authorised trainers** and then **allowed to operate the vehicle loading crane on site before being assessed and authorised**. This breaches the Training Scheme in both instances.

**Chris Belfield was never trained or assessed to the Black Coal Competencies as required by the Training Scheme.** This has been explained in section 5.9.3 (a) of this report. This is another breach of the legislation.

#### b) Health Assessment – Section 46 of the Coal Mining Safety and Health Regulation 2001

From the documentary evidence supplied by the BMA Blackwater Mine, Chris Belfield was inducted on the 4/5/01 and received a Generic Induction Passport No. 31688 and a BHP SGS QLD Induction and Site Access Card No. MK11000409. He then worked on site from the 17/5/01 to the 24/5/01. On the 6/7/01, he attended a Pre-employment Health Assessment conducted by Dr. George Belonogoff.

**This is a breach of Section 46(4)(a) which states “The assessment must be carried out before the person is employed as a coal mine worker.”**

## 7.0 RECOMMENDATIONS

It is hereby recommended that :-

### 7.1 RECOMMENDATION 1

Risk assessments should be carried out on the operations of all vehicle loading cranes used in the industry and appropriate controls should be put in place to ensure the operator is not exposed to an unacceptable level of risk. Included in the risk assessment should be the:

- a) Design features of the vehicle loading crane including:
  - Guarding of the control levers;
  - Location of the control levers;
  - Slew of the crane within the area of the control levers;
  - Direction of the control lever movements for each function;

- Labelling of the functions;
  - Ability to release hydraulic pressure in the case of an emergency.
- b) Configuration of the crane on the vehicle, with special attention given to:
- The use of the vehicle and vehicle loading crane;
  - The location of the crane slew end points;
  - The vision of the operator;
  - The location of the operator when folding/unfolding the crane;
  - The confinement of the operator's work area at the control levers.
- c) Operational activities.

## 7.2 RECOMMENDATION 2

Training and Assessment packages for the operation of vehicle loading cranes within the industry should be reviewed to ensure the hazards of operation are identified and addressed. As part of the review, particular reference should be made to the General Requirements of the Australian Standard AS 2550.1 Cranes – Safe Use, which addresses the operational hazards associated with this accident. Critical aspects to be considered should be:

- The implementation of 'no-go' zones around the operator's control panel where the crane should not be operated or slewed into;
- The description of these 'no-go' areas including the use of drawings, photographs and videos;
- The importance of watching the crane hook when operating crane;
- The importance of not working under the boom of the crane;
- Recording of the inspections and any defects found, in a Log book.

## 7.3 RECOMMENDATION 3

Manufacturers that supply vehicle loading cranes to the industry should be informed of this accident and the outcomes of the investigation so that engineering design changes can be made to ensure:

- That a crane cannot be slewed into the operator's working area at the controls;
- That the operations of the control levers for similar functions are the same;
- That to lower the boom or jib should require the control lever to be moved upwards;
- That the location of the control levers allows a person to operate the crane in safety with clear vision of the operations;
- That the control levers are guarded or shrouded to prevent accidental operation;
- That the geometry and configuration of the jib ram or hydraulic circuit to this function is modified to remove the acceleration of the jib when it passes the centre of the pivot between the jib and boom.
- That deadman controls are incorporated that will stop all operations in the event of an accident or absence of the operator from the controls.

**7.4 RECOMMENDATION 4**

Instruction manuals and training material should not display drawings and photographs that encourage unwanted practices and risk to the operator. Appendix 22

**7.5 RECOMMENDATION 5**

Contractors and Suppliers to the industry who operate vehicle loading cranes on mine sites, should be made aware of this accident and the outcomes of the investigation so that the equipment and operation of the equipment meet the standard required by industry.

**7.6 RECOMMENDATION 6**

Workplace, Health and Safety should be informed of the accident and the recommendations so that they can take similar actions with other industries.

**7.7 RECOMMENDATION 7**

The Chief Inspector of Coal Mines should convene a Review Committee as allowed for in the Compliance Policy to determine the appropriate action/s to be initiated in response to the legislative non-compliance issues as detailed in Section 6.5 of this report.

**7.8 RECOMMENDATION 8**

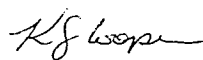
BMA Blackwater Mine should conduct a review of the Contractor Management Procedure with special consideration given to the following issues:-

- a. Training and Authorisation of contractors in compliance with the legislation.
- b. Use of the correct forms eg BMA CONTRACTOR EMPLOYEE AUTHORISATION QC-FSAF005.
- c. Audit content and competency of the people conducting audits.
- d. Compliance with procedures by contractors eg In this incident, use of the Vehicle Usage Log and Inspection Records by Ergon Energy employees.

**7.9 RECOMMENDATION 9**

Open cut coal mining operations should review their Emergency Response Plans to ensure:-

- a. An emergency signal initiated following an incident, can be received by all personnel using two-way communications.
- b. The emergency signal does not impede further communications on the two-way system.
- c. In the event of an emergency that traffic on mine roads, stop and allow a clear travel way to all emergency vehicles.



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