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Investigation Report

Elevated work platform incident resulting in injuries at the Bulga Open Cut Mine on 21 March 2006

Report prepared for the Director-General of the Department of Industry and Investment by the Investigation Unit, Thornton

Mine Safety Investigation Unit

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Elevated work platform incident resulting in injuries at the Bulga Open Cut Mine on 21 March 2006

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Overview

The incident

On 21 March 2006, at about 12.15pm, Andrew Baxter, a subcontracted rigger, suffered a crush injury to his right index finger when the elevated work platform (EWP) in which he was working rammed the bucket of a P&H 4100 shovel. At the time Mr Baxter was involved in replacing hoist ropes on the shovel as part of planned maintenance.

The operator of the EWP, an employee of the maintenance contractor, was also injured, being for a time trapped by the crushed side of the man-basket and suffering bruising to his right foot.

Incident site

The incident took place at Bulga Open Cut Mine 18 km south of Singleton in the Hunter Valley of New South Wales.

The mine

Bulga Open Cut is a large open pit mine that uses dragline, shovel and trucks to extract about 10 million tonnes of raw coal each year. At the time of the incident the mine employed about 540 employees and contractors.

The mine company

Bulga Coal Management Pty Limited operates the mine on behalf of the Bulga Joint Venture. The major shareholder, and ultimate holding company, of Bulga Coal Management Pty Limited is Oakbridge Pty Limited.

Maintenance contractor

Harnischfeger of Australia Pty Ltd, then trading as P&H MinePro Services (Australasia), offer after market engineering support and service for the range of their equipment. The company had established a site office at the Bulga mine to provide maintenance on the dragline and the P&H 4100 shovel.

Labour-hire subcontractor

Ellavale Engineering Pty Limited provide maintenance and engineering services to the mining and construction industries, specialising in the maintenance and repair of large equipment.

Ellavale Engineering had a labour hire agreement with P&H MinePro Services. Under this agreement, Mr Baxter as an employee of Ellavale Engineering, had been working at the Bulga mine for several months. Several other Ellavale Engineering employees were also supplied under the labour hire agreement on the day of the incident to help with the planned shut down and maintenance of the shovel.

Equipment hire company

Boom Logistics Ltd is a large crane and lifting solutions company supplying plant and equipment to the mining industry. Boom Logistics owned the EWP (JLG 80HX+6 model aerial boom lift) that was dry hired to P&H MinePro Services on the day of the incident.

The incident

Planned maintenance on the shovel

Regular inspection of the P&H 4100 shovel identified that the hoist ropes were showing signs of wear and needed to be replaced. This task was scheduled to be performed on Tuesday 21 March 2006 during the next regular weekly maintenance on the shovel. The maintenance was to be performed by P&H MinePro Services personnel at the mine, along with personnel from their

subcontractor, Ellavale Engineering Pty Limited.

Planning for the task was a joint undertaking by personnel from Bulga Open Cut Mine and P&H MinePro Services. The P&H Project Supervisor undertook to identify the need for an elevated work platform or cranes and to arrange supply of the plant. The Bulga Coal Mine personnel prepared an area at Bulga main pit strip 24 where the service could be performed.

Decision to use larger EWP

Although the Bulga Coal Work Procedure entitled *Replace P&H Shovel Hoist Ropes* specified use of a 40 foot aerial lift, the P&H Project Supervisor ordered an JLG 80HX+6 Aerial Lift, which had an 80 foot telescopic lift. The larger machine was selected because it seemed better suited for profiling and hardness testing of the shovel. It would also negate the need for two aerial lifts to be at the shovel.

The EWP was hired from Boom Logistics, who had a contracted fitter conduct a safety check on the EWP the day before it was delivered to the mine site.

Pre start toolbox meeting

The P&H Project Supervisor conducted a toolbox session with the maintenance crew before work began on 21 March 2006. About 20 personnel from P&H MinePro Services, Ellavale Engineering and other contractors attended this meeting at 7.00am. The day's tasks were discussed and prepared risk assessments or Job Hazard Analysis(JHA) forms were handed out. The risk assessment for *Replace Hoist Ropes* was given to the hoist rope crew, which included Mr Baxter. The P&H Project Supervisor told this crew to "..modify the JHA as required..."

Maintenance work begins

The shovel was positioned at the prepared work area and machine isolations were performed. The P&H Project Supervisor went back to the teams to review any changes to the JHAs. The hoist rope crew signed off on their JHA. At this stage specific tasks were allocated. Mr Baxter and a P&H Minepro Services leading hand fitter were assigned to the EWP bucket, while other personnel were allocated to the shovel house drum tasks.

Checking the EWP

The EWP was delivered to the site after the pre start toolbox meeting had concluded. Mr Baxter went to the EWP and completed a safety check or '103 inspection'. He used the checklist in the *EWP Safety Check and Routine Maintenance Logbook* supplied with the machine. He signed the logbook at 8.30 am and did not record any faults.

Mr Baxter drove the EWP to the work area and then handed it over to the P&H Minpro fitter, who did his own safety check but did not record it. This check included operation of the platform level controls and the locking mechanisms.

In carrying out these inspections neither Mr Baxter nor the fitter identified a defect in the machine, namely that the safety catch that prevented the drive controller moving from the neutral position was not working properly.

Replacing the shovel ropes

The old ropes were removed from the shovel. Mr Baxter and the fitter in the EWP man-basket removed the rope retainers. New ropes were then fitted up to a point where they needed to be guided into the bucket equalizer before refitting the rope retainers. Mr Baxter began sorting the new ropes and the EWP was driven in and out by the fitter to position the ropes correctly.

EWP operated at the wrong speed

The EWP operated in two speeds – high and low. The P&H Minepro Services fitter left it in 'high' speed while he prepared to 'boom it up' or lift the boom to get Mr Baxter and himself into position to work on the ropes. This mode of operation directly contravened the clear instructions and cautions contained in the *Operators and Safety Manual* for the machine when it was operated in close quarters to other machinery.

EWP crashes into the bucket

At about 12.15pm the fitter was holding a hoist rope when he turned around to reach the boom lift-lever which moves the man-basket up and down. At the same time his foot was on the 'deadman's pedal'. The EWP suddenly lurched forward into the bucket equalizer. The impact crushed the man-basket door, pinning the right foot of the fitter. After several attempts he was able to stop the EWP using the emergency stop button on the platform control panel.

In the impact Mr Baxter suffered a crush injury to his right hand index finger, severing the tip and breaking the bone.

Emergency response

The P&H Project Supervisor initiated the site emergency response procedures. Attempts were made to lower the man-basket and move the EWP using ground controls but this was unsuccessful because the EWP cannot be driven forwards or backwards using the ground controls.

Mr Baxter had to climb over the shovel bucket to safety, while oxy-acetylene equipment was used to cut the fitter free of the crushed railing. Eventually the EWP was dragged back from the bucket using a dozer.

Medical attention

Mr Baxter and the fitter were treated in the Bulga mine first-aid room before being taken to Singleton Hospital. The fitter suffered bruising to his right foot and was released from hospital that day. Mr Baxter was transferred to Maitland Hospital where surgery was required to repair his injured finger.

Aerial lift and P&H 4100 shovel bucket

Man-basket, hoist ropes and equalizer

Man-basket showing damage to platform door

The injured person

Name:	Andrew William Baxter
Age at time of incident:	49
Employer:	Ellavale Engineering Pty Limited
Status of employment:	Permanent employee since May 2005
Mining experience:	10 years coal industry
Date of incident:	21 March 2006
Time of incident:	12.15 pm
Place of incident:	Bulga Open Cut Mine – main pit strip 24 north
Nature on injuries:	Crush injury to right hand index finger, severing the tip and breaking the bone. Injury needed surgical repair and debridement to the right index finger.

The investigation

The incident was investigated to uncover its causes and relevant circumstances. The investigation provided the basis for making recommendations to help prevent similar incidents and to identify potential breaches of legislation.

Investigation methodology

The lines of inquiry

Lines of inquiry followed during the investigation included:

- Documenting the scene by way of notes and photographs
- Collection and examination of exhibits
- Interviews with persons present at the scene as well as the various company representatives
- Conducting a scene re-enactment
- Document collection from companies involved
- Obtaining equipment information concerning the EWP
- Examining the various company safety systems applicable to the work and the actual system of work used at the incident site.

Department inspection of the incident scene

An Inspector of Coal Mines from the Department arrived at the site of the incident about 4.00 pm on the day it occurred. He secured the scene, conducted an initial assessment and took photographs. Further assessments of the incident scene were carried out over the following two days. This included a review of the mechanical engineering aspects of the incident. Later a Department mechanical mine safety officer was present when Bulga Coal conducted an engineering review of the EWP, including a review of its operational functions.

Documents

Company documents relevant to the incident were collected and examined during the investigation. Priority was given to documents relating to safety and safety systems

Findings

A combination of factors came together to allow this incident to occur. These factors included actions by relevant personnel, plant defects, inadequate training and supervision, inadequate risk assessments, failure to ensure safe systems of work and provision of necessary information and instruction to the operators.

Actions by personnel

The action of the operator in trying to move the EWP while holding a hoist rope created a potential for the EWP to behave unpredictably. A re-enactment of the scene showed that the operator could not hold onto the ropes and see what lever he was reaching for as this required a 180 degree turn to face the operational panel of the EWP.

Unintended movement of the drive control lever

The investigation showed that the EWP could not have lurched forward if the drive control lever had remained in the neutral position. However, there was no evidence that the P&H Minepro Services fitter or Mr Baxter had intentionally operated the lever. It was concluded that in some way either the fitter or Mr Baxter unintentionally lent on or bumped the drive control lever either before or at the time the fitter placed his foot on the 'deadman's pedal'.

The investigation noted that there was restricted room available to the two men in the man-basket as they tried to manipulate the heavy hoist ropes.

Defect in the EWP

Examination of the EWP found that the drive controller slide lock mechanism was jammed in the up position. This was caused by the drive controller lever shaft being bent off centre. The jammed slide lock would not affect the operation of the drive control lever but it would prevent the control lever being locked in the neutral position to prevent inadvertent operation.

The bent centre shaft of the drive controller

Inadequate plant inspection

Mr Baxter and the fitter, who operated the EWP, both inspected the machine before starting operations. Neither of them identified that the drive controller slide lock mechanism was jammed in the up position making it impossible to lock the drive controller in the neutral position.

The pre-deliver inspection conducted by Boom Logistic Ltd. also failed to identify this fault.

Inadequate training

Mr Baxter was an experienced operator of EWPs and held a National Certificate of Competency for work platforms issued by WorkCover NSW.

The P&H Minepro Services fitter, although an experienced EWP operator, did not hold a certificate of competency or WorkCover Certificate for the machine as required by the Bulga Contractor Safety Management Plan or the P&H MinePro ProSafe ES&H Management System. He only held a Certificate of Attendance for EWP Operation training.

When previously employed by the Bulga mine the fitter attended a one day EWP course but the trainer noted that he had not achieved the required competence and recommended further assessment. No record was found of any further assessment being performed, however the fitter was recorded in

the mine's training records as an EWP operator.

Inadequate supervision of contractors

While the hoist rope replacement was being carried out, and before the incident occurred, a Bulga Coal team leader inspected the work area using the company's Task Safety Checklist. The checklist required that the competencies of the work crew be checked, however the team leader failed to complete this part of the checklist.

Inadequate risk assessment and system of work

Bulga Coal prepared a work procedure for replacing hoist ropes. The procedure was implemented and the required JHA was completed. However, the risk of unplanned or inadvertent movement of the EWP was not identified although unplanned or inadvertent movement of other plant involved in the work had been identified.

If this risk had been identified operators would have been required to develop and implement risk controls to manage the issue. There were a number of extension, boom and motor settings that can be used to prevent the machine from high revving and lurching forward. If these machine controls had been properly used it would have prevented the incident.

Risk assessments undertaken during the prestart toolbox meeting were brief and inadequate. They were done before the EWP arrived on site so the work crew could not assess the implications of using an EWP with an 80 foot boom rather than the 40 foot boom specified in the mine work procedure.

Inadequate provision of information and instruction

The crew was given no additional information regarding the safety of the EWP despite the fact it was twice as large as specified in the JHA. The operators were left to make their own changes to the JHA before undertaking the task.

Preventing a recurrence

Contractor management

Management of contractors and their employees must be to a standard directly relating to the risks they are exposed to in the work they undertake.

Those engaging contractors must make sure they meet a similar standard of health and safety as that required under the mine's own OHS management system. There must not be different standards of safety at the one workplace.

Mines can achieve equal high standard of health and safety performance through regular monitoring and review of the contractor's management plans, contractual arrangements and contractor OHS management systems. Third party audits of contractor OHS management systems can help in this process.

Risk management

Mining companies and contractors must consider the **quality** of risk management undertaken in their workplaces to make sure it meets the degree of risk involved in the work. For example, release of energies associated with plant and machinery is a serious risk with potential for death or serious injuries. This level of risk must be kept in mind when performing risk assessments associated with the operation of plant and machinery.

Actions after the incident

Action taken by Bulga Open Cut Mine

Contractor management

After the incident Bulga Coal Management Pty Limited has strengthened its management and supervision of the work of contractors across all of its operations.

Enhanced job assessment

The mine introduced a system of 'pre-job appraisal' that requires the nature of work to be carried out to be assessed and any equipment used in its operations to be tagged. Each person involved in the work, whether a contractor or employee of a contractor, must complete a questionnaire covering 11 matters fundamental to the safe execution of the task.

Action taken by P&H Minepro

Risk assessment for EWPs

P&H Minepro Services introduced a risk assessment tool to be used with EWPs that included a number of controls identified during investigation of this incident. The assessment tool included the following aspects:

- unplanned movement of the propel system
- only one operator to control the EWP without doing any other tasks
- strict adherence to using the hydraulic extension when within 2 metres of the access area
- strict adherence to using the 'slow' mode when within 6 metres of the access area
- supervisor / leading hand must sign off on all EWP risk assessments
- careful consideration required for selection of suitable size EWP.

Toolbox talks on the incident

The company carried out toolbox talks with all its work crews regarding the incident and the lessons to be learnt. The toolbox talks covered the new requirements for risk assessment of EWPs.

Risk assessment data base

The company established a computer data base to collect and give easy access to all risk assessments.

Action taken by the Department

Investigating the incident

The Investigation Unit conducted a scene assessment on 21 March 2006 and carried out a detailed and thorough investigation into the incident.

Safety Alert SA 06-15 released

On the 30 June 2006 the Department issued safety alert *SA06-15 Unplanned movement of elevating work platform* warning industry of the incident.

Notices issued

A notice was issued to Bulga Coal under section 63(1) of the *Coal Mines Regulation Act 1982* imposing restrictions with regard to the EWP and requiring an independent assessment of its operations.

An improvement notice under section 91 of the *Occupational Health and Safety Act 2000*-was issued to Boom Logistics Ltd. regarding safety issues relating to the EWP.

Related Published Resources

Safety Alert

The Department published a safety alert relating to this incident on 30 June 2006, see: *SA06-15 Unplanned movement of elevating work platform*.

Contractor and risk management

- MDG 5003 *Guidelines for Contractor Occupational Health and Safety Management for New South Wales Mines*
- MDG 1010 *Risk Management Handbook for the Mining Industry*
- *MDG 1014 Guide to Reviewing a Risk Assessment of Mine Equipment and Operations*