Investigation report

Report into a fatality at the Grasstree Coal Mine Middlemount, Queensland on 6 May 2014

16 May 2018

Queensland Government

Summary

On 6 May 2014, Mr Paul McGuire was fatally injured while calibrating gas detectors underground at the Grasstree coal mine. In performing this task, Mr McGuire opened a hatch which released a flow of an irrespirable atmosphere, asphyxiating him almost immediately.

In accordance with its obligations, an Anglo American Capcoal Management Pty Ltd officer notified the Mines Inspectorate that a worker had been injured in an incident. A short time later the Mines Inspectorate was notified that the incident resulted in a fatality. The incident site was secured by the mine. Queensland Police Service took control of the site and completed an investigation before releasing the site to the Mines Inspectorate.

Completed in October 2014, the Mines Inspectorate investigation identified several factors that contributed to the incident. It also identified safety concerns surrounding the emergency response to the incident. The factors demonstrated lapses or omissions in planning, supervision and training and included breaches of the *Coal Mining Safety and Health Act 1999* (the Act). In addition to pursuing prosecution action against the mine Operator, the Mines Inspectorate made a number of recommendations intended to improve the safety of the Grasstree mining operation.

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Glossary

CMW	The acronym for Coal Mine Worker – a generic term for employees in a range of roles at the mine
CPR	Cardiopulmonary resuscitation
Goaf	The waste left in, or the area of, disused mine workings
Longwall Mine	A form of underground coal mining where coal is extracted from panels in a single block formation of varying dimensions, typically 300 metres long by 300 metres wide. Coal is extracted using a shearer which cuts a web of coal in a single shear (typically 0.85 metres deep) across the width of the panel. The shearer and longwall equipment retreat to the outbye end of the panel in this process.
NERZ/ERZ	The acronym for Negligible Explosion Risk Zone/Explosion Risk Zone. The term is used to describe the general body concentration of methane gas for purposes of defining where in the mine different classes of machinery may operate. • NERZ is where the general body concentration of methane gas is less than 0.50% • ERZ1 is where the general body concentration of methane gas is between 0.50% and 2.00%. • ERZ0 is where the general body concentration of methane gas is greater than 2.00%
NERZ/ERZ detector	A fixed location, real-time gas monitor mounted at the boundary between the NERZ/ERZ which trips power when general body concentration of methane gas exceeds 0.50% (detectors may also be referred to as 'sensors').
Outbye	The area of the mine away from the coal face being mined (opposite of Inbye)
Overcast	An airway passage that enables one air current to pass over another
Tube Bundle systems	A mechanical system for drawing atmospheric gas samples through tubes from multiple monitoring points in an underground mine to be analysed at the surface of the mine.
Real Time systems	An electronic system of sensors placed throughout an underground mine to provide instantaneous measurement of atmospheric gas concentrations

Grasstree Mine roles

Control Room Officer (CRO)	A person appointed to monitor and acknowledge gas alarms at the surface of the mine.
Electrical Engineering Manager (EEM)	A statutory position responsible for the design, installation and maintenance of electrical equipment
Long Term Planner	Responsible for maintaining Ellipse (computer-based planning system) and distributing Job Cards used to maintain the gas detection system
Mine Senior Official (MSO)	A person appointed to be responsible for supervising all activities on each shift. Generally appointed as the Underground Mine Manager's delegate in their absence.
Outbye Electrical Coordinator	Responsible for the maintenance of real time gas monitoring systems in the outbye area
Outbye ERZ Controller	A statutory position responsible for supervising, assessing and managing explosion risks
Site Senior Executive (SSE)	A statutory position for the most senior officer employed at the mine who has responsibility for the mine
Ventilation Officer (VO)	A statutory position with responsibility for ensuring adequate ventilation of the mine, including systems in place to monitor and measure mine ventilation
Ventilation Stopping	A structure (temporary or permanent) built across a roadway to direct the airflow

Purpose of the report

The Queensland Government believes that providing information relating to safety incidents on mine sites is an important part of continuous improvement of mine safety.

This report is based on the findings of an investigation by the Queensland Mines Inspectorate (coal) and has two key purposes:

1) To provide family, friends and co-workers with an understanding of the events leading to the death of Mr McGuire at the Grasstree Mine; and
2) To inform industry, government and the broader public of recommendations arising from the Investigation with the goal of reducing the likelihood that such an event occur again.

The investigation

At 3.56pm, 6 May 2014, the Deputy Chief Inspector of Mines was notified of a serious accident involving a Coal Mine Worker (CMW) by Grasstree Mine's Site Senior Executive (SSE). The SSE was asked to ensure the scene was secured. Soon after, the Queensland Police Service (QPS) advised the Mines Inspectorate of the fatality. Mines Inspectorate officers arrived on site at 6.00pm and 6.45pm and met with QPS and mine personnel. At 11.00pm the QPS determined it had no jurisdiction in relation to the incident and released the site to the Mines Inspectorate for its investigation. At 9.30am, 7 May 2014 additional Mines Inspectorate officers arrived on site to assist with the investigation.

The investigation process included an inspection of the scene, collection of available evidence, obtaining and reviewing site documentation, interviewing personnel and obtaining mine atmosphere gas monitoring data. The process also included a time and motion study undertaken by an Inspector of Mines (electrical), on 13 August 2014. The study was conducted to determine the most likely travel route taken by Mr McGuire immediately before the incident. Using the location of Mr McGuire's last physical contact at 12.57pm (with a conveyor engineer at the 27a cut through B Heading East Mains) as the start point, and the location where he was found unconscious by the acting Ventilation Officer (the seal at 0-1 cut through B Heading 901 tailgate), it was determined that there were four possible routes Mr McGuire could have taken within the approximately five minute period indicated by the data.

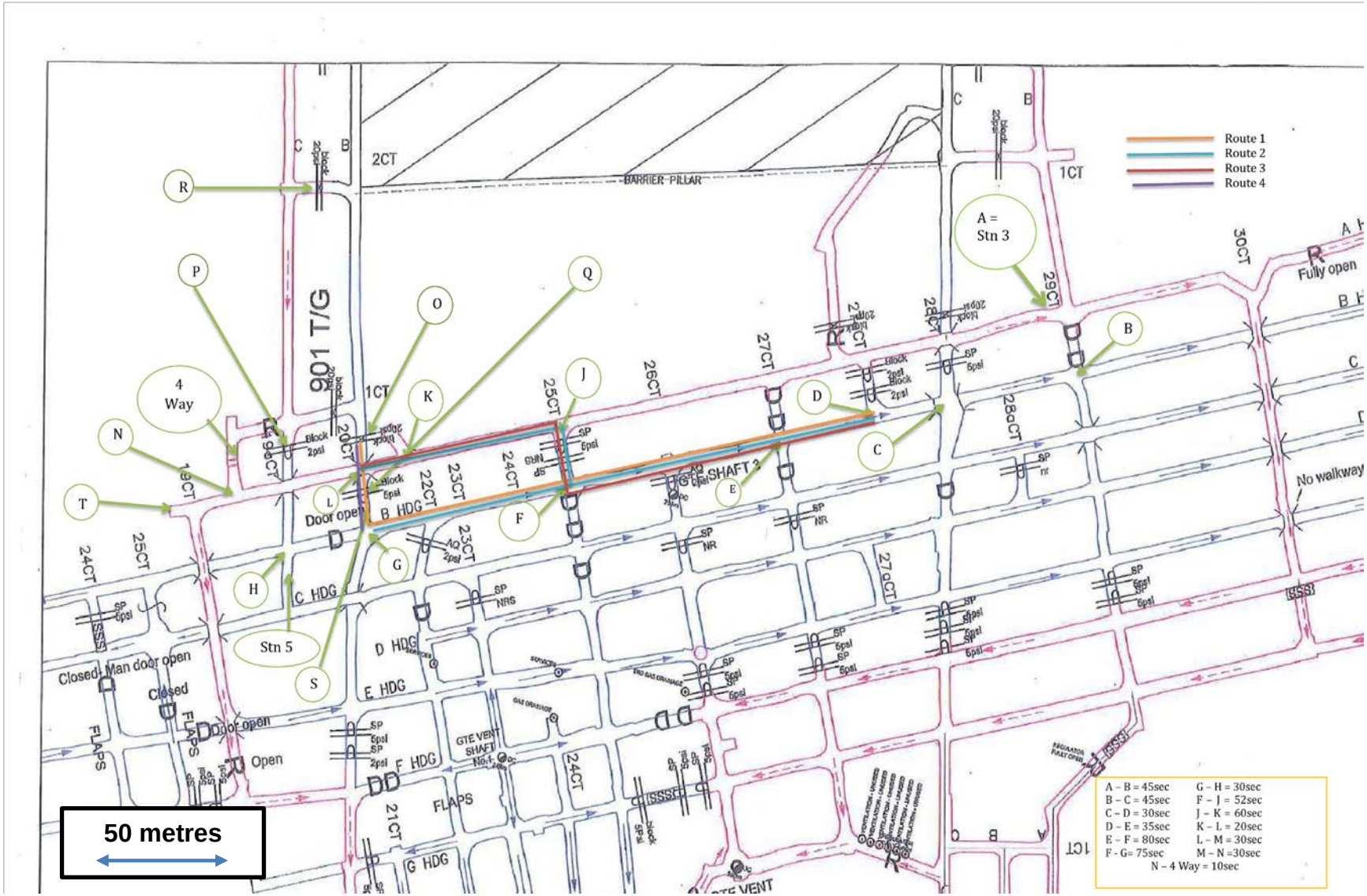
The Mines Inspectorate investigation team gathered and analysed all information to determine organisational factors, task environment conditions, individual/team actions and absent or failed defenses that contributed to the accident.

Mr Paul McGuire

Mr Paul McGuire was an electrician at the Grasstree mine. He was 34 years old, lived in Middlemount, Queensland and is survived by his wife and two daughters.

Mr McGuire had worked at the Grasstree mine for 9 years, starting as a Mine Technician in 2005 and moving into the role of Electrical Maintenance Technician in 2012 upon completion of his apprenticeship. He was studying with the intent of obtaining his Explosion Risk Zone (ERZ) Controller qualification.

Diagram 1: Plan of incident area showing possible routes of travel and infrastructure



The mine

The Grasstree Mine is an underground longwall coal operation that forms part of Anglo Coal Australia's Capcoal complex. Located 25km southwest of Middlemount in Queensland's Bowen Basin, the mine produces hard coking coal for export steel markets. The Aquila underground mine and the Lake Lindsay and Oak Park open-cut mines combine with Grasstree mine to form Capcoal (also known as German Creek Mine). As part of Anglo Coal Australia's five mine complexes in Australia that provide work for around 3,000 people, Capcoal has an annual production capacity of 6 million tonnes of coal and employs around 700 people.

History of the sealing of 901 longwall at the Grasstree Mine

The 901 Longwall commenced production in October 2013. The cessation of production and relocation of equipment began in March 2014.

In January 2014 a risk assessment for sealing the goaf of the 901 Longwall was conducted, facilitated by the Ventilation Officer. The risk assessment included the positioning of goaf seals to establish an inert atmosphere.

However, the sealing plan, finalised in March 2014, differed from the risk assessment. The seal at 0-1 cut through B Heading 901 tailgate did not contain a hatch in the risk assessment, but did include a hatch in the plan of proposed works. While not documented in the mine's established 'change management process', the basis for the change was to facilitate drawing the inert atmosphere up to the seal via movement of air through the hatch to engineer a faster inertisation of the goaf.

The seal at 0-1 cut through B Heading 901 was closed on 17 March 2014 and the hatch secured by a nut and bolt arrangement.

Gas detector calibration and movement

Grasstree mine installed a comprehensive gas monitoring system as required by legislation. The system at Grasstree mine comprised both tube bundle systems and real-time systems. Both systems reported data to a central control room on the surface of the mine. If gas readings reached designated trigger levels, an alarm sounded in the control room.

It is necessary to frequently relocate gas monitoring detectors in longwall mine operations as the coal face being mined retreats. The process of longwall mining includes sealing off areas where coal extraction is completed and moving the infrastructure – including detectors – to the next area of extraction.

To maintain the effectiveness of the gas monitoring system, the mine had a documented process for authorising and accurately reporting the change in location of detectors. The process utilised an "Authorisation to Change Gas Sensor Locations" form and was the responsibility of the Ventilation Officer.

A Job Card system was used to manage the maintenance of the detectors and associated detection system. Job Cards were generated by a computer system (Ellipse) which was maintained by the Long Term Planner. The process of directing when, how and who calibrates and maintains the gas monitoring system was the responsibility of the Outbye Electrical Coordinator.

The investigation identified inconsistencies between the location of gas monitors as reported by the Job Card system and where they were actually located in the mine.

Of particular concern to the investigation was that on three occasions prior to the fatal accident (4 February 2014, 6 March 2014 and 1 April 2014), the NERZ/ERZ gas monitoring detector known as 'Station 5 Channel 7' was reported on the Job Card System to have been in place at location 6-7 cut through B Heading tailgate 901, despite:

- an "*Authorisation to Change Gas Sensor Locations*" form having been completed on 14 January 2014 to move the detector to 1-2 cut through B Heading tailgate 901;
- on 4 February 2014, an electrician had manually noted on his Job Card that the detector was not where the Job Card reported it to be. He reported the detector was at 1-2 cut through B Heading tailgate 901; and
- on 10 March 2014 in response to an *"Authorisation to Change Gas Sensor Locations"* form, the acting Electrical Engineering Manager (EEM) was to remove the detector from 1-2 cut through B Heading tailgate 901, however noted on the form that he had disabled but did not remove the detector because he could not access it due to a ventilation stopping in the roadway.

When Mr McGuire collected his Job Card on 6 May 2014, it still reported the location of the NERZ/ERZ gas monitoring detector 'Station 5 Channel 7' as located at 6-7 cut through B Heading tailgate 901.
However, as of 10 March 2014 the detector had been disabled and was located at 1-2 cut through B Heading tailgate 901.

The incident

The day shift of 6 May 2014 commenced at 6.00am with a Mine Senior Official (MSO) briefing meeting. During the meeting, the Outbye ERZ Controller was requested to conduct a statutory inspection of the 901 tailgate gas monitoring detectors so that an electrician could access the area to complete calibration work.

The Outbye ERZ Controller completed the inspection of 901 tailgate area at 6.50am and noted this time with his initials on the 19a cut through A-B Heading man door. It was a statutory requirement that return airways be inspected and that the inspection approval would remain valid for 6 hours.

The handover from the night shift MSO to the day shift MSO was conducted at 7.00am. No discussion was held regarding the calibration of 901 tailgate gas monitoring detectors. The task to calibrate the 901 tailgate gas monitoring detectors was not documented in the mine's 24 hour plan which had been compiled on the previous day.

On 5 May 2014, the Outbye Electrical Co-ordinator at the mine had a discussion with Mr McGuire in relation to the scheduled calibrations of gas sensors. Part of the conversation included that in order for the mine to maintain statutory compliance, the calibrations of gas sensors were required to be completed by 6 May 2014. The Outbye Electrical Co-ordinator told Mr McGuire that he was to complete the task the next day.

On 6 May 2014 Mr McGuire was rostered on the afternoon shift. He arrived onsite at approximately 11.15am. It was a maintenance day at the mine, meaning that the Longwall was not producing that day so that various maintenance tasks could be performed.

Mr McGuire attended the pre-shift briefing and collected the Job Cards for his scheduled tasks for the shift. This included Job Card 00913709, which incorrectly identified station 5 channel 7 sensor as being located at 6-7 cut through B Heading 901 tailgate. In fact the sensor was no longer at that location; it had been disabled and was no longer in use. The location identified on the Job Card – 6-7 cut through B Heading 901 tailgate – was by that time in a goaf.

Mr McGuire arrived at pit bottom at approximately 12.18pm.

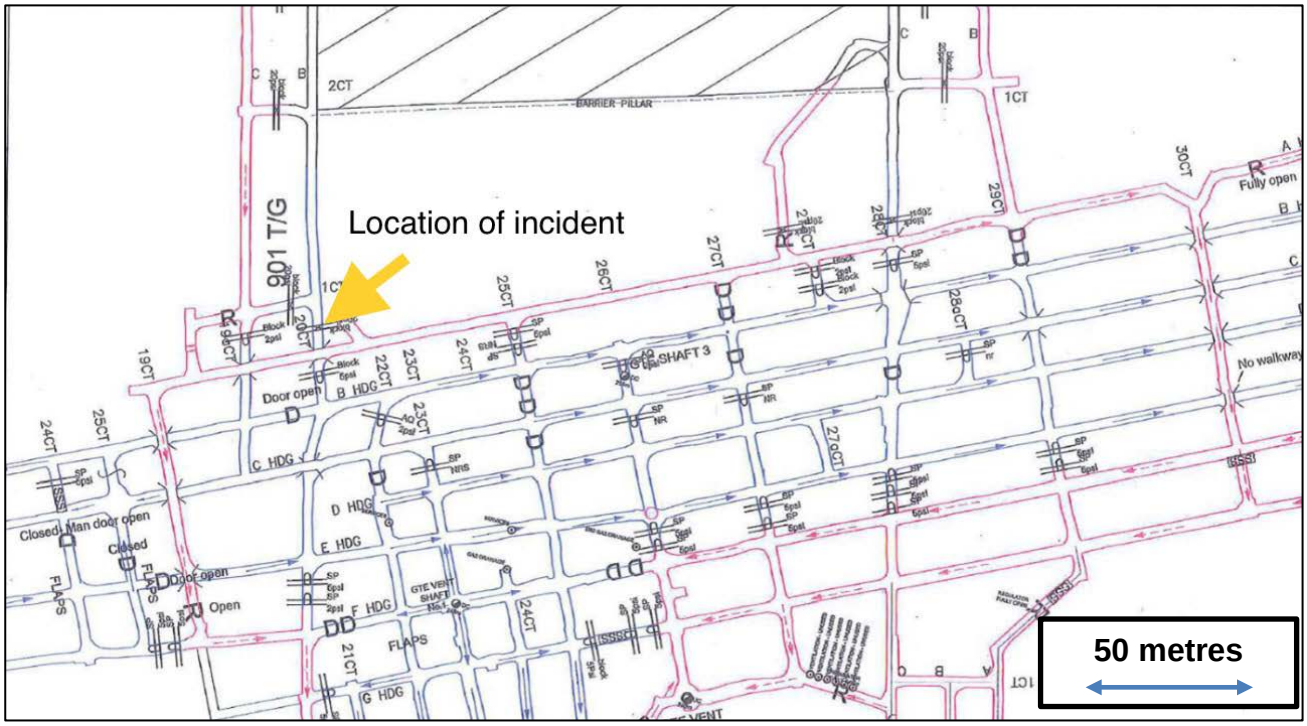
At 12.23pm Mr McGuire made a call to the control room and stated that he was going to perform gas calibrations at the sensors located at both Station 3 and Station 5.

Mr McGuire completed the gas calibrations at Station 3 sensors at approximately 12.53pm. He then contacted the control room and informed the operator that he was going to undertake calibration at Station 5, 901 tailgate.

At approximately 12.55pm Mr McGuire had a conversation with another coal mine worker at 27a cut through B Heading. Mr McGuire told the coal mine worker that he was going to 901 tailgate.

At approximately 1.05pm, Mr McGuire opened the hatch at 0-1 cut through B Heading 901 tailgate by using a spanner to access the sensor. The hatch had been closed with a nut and bolt arrangement. As a result of opening the hatch, Mr McGuire inhaled irrespirable atmosphere and was fatally injured.

Diagram 2: Location of incident



Emergency response

A ‘high high’ level methane alarm (in excess of 1.25% general body concentration of methane gas) activated in the Control Room at 1.07pm for the No2 Shaft West monitor.

The relief CRO discussed the issue with the acting EEM who was in the control room at the time. They then called the MSO into the room and it was decided, under the assumption the alarm was probably due to a faulty detector, that the acting EEM would investigate.

The acting EEM entered the return at the bottom of shaft 2 at 1.57pm (50 minutes after the alarm initiated) and investigated the assumed faulty gas monitoring detector. During this time his Portable Gas Detector alarm was sounding and showed a peak concentration of methane gas at 1.86%. After replacing the detector the acting EEM concluded that the alarm was due to elevated gas levels. The MSO and the (relief) Ventilation Officer (VO) were dispatched to investigate the nature of the elevated gas levels.

They entered the return at the bottom of shaft 2 at 2.26pm. They walked the return against the air flow towards the 901 District and identified the source of the high methane as the 901 tailgate B Heading seal. During this process the MSO’s Portable Gas Detector alarmed several times.

Once on the other side of the overcast, the MSO tested the atmosphere exhausting from the airlock and found it contained in excess of 5.00% methane. The MSO and the VO went to the B Heading side of the 20 cut through A-B Heading. The VO observed that the No Road tape, used for preventing CMWs entering an ERZ0, was caught in the door of the stopping. They jammed the man door open with a disused wooden pallet (which was lying nearby) to create a short circuit of fresh air. They had to jam the door open as the ventilation pressure (1350 kpa) across the door made it difficult to open.

With the door jammed open, the men returned to A Heading return (via 25 cut through).The VO entered 20 cut through overcast via a man door and observed Mr McGuire collapsed at the entrance to the 0-1 cut through B Heading 901 tailgate seal and called *"man down, man down".* The MSO then followed the VO through the 20 cut through overcast man door.

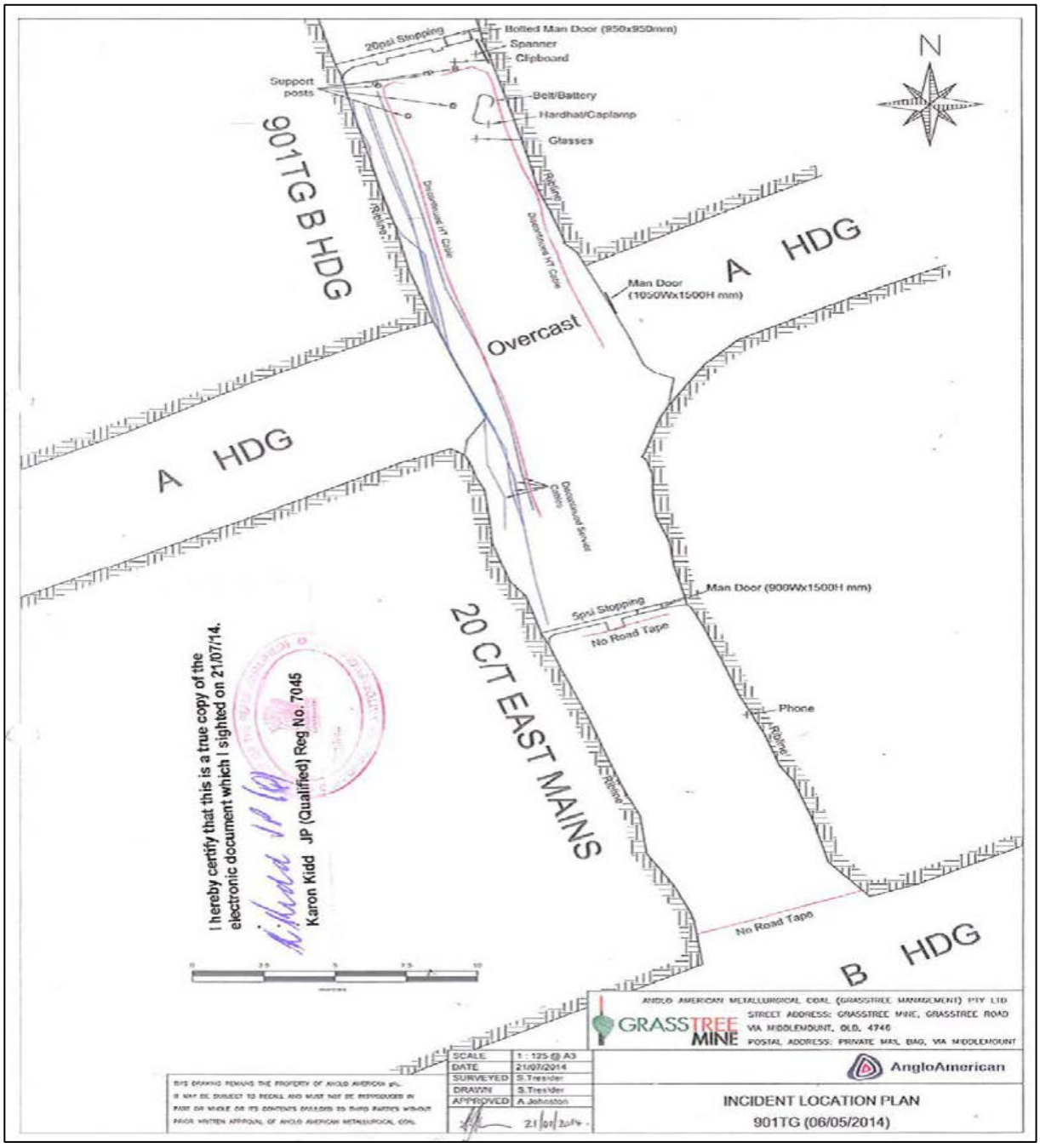
The VO and the MSO attended to Mr McGuire and observed his leg caught in the door of the hatch and that he was slumped back in the opening on the overcast side of the seal. After releasing his leg from the seal hatch, attempts were made to revive him using CPR.

The MSO made the initial Emergency Call to the Control Room at 3.01pm. The CRO activated the emergency response and at 3.03pm contacted the Queensland Ambulance Service.

An underground mine ambulance was dispatched and brought Mr McGuire to the surface First Aid room at 3.22pm.

After continued resuscitation attempts, Mr McGuire was pronounced deceased at 3.42pm by the attending Queensland Ambulance Service paramedic.

Diagram 3: Survey of the accident scene



Cause of death

A post-mortem report indicated that Mr McGuire died almost instantly of asphyxiation. This resulted from the contents of the inert atmosphere behind the seal flowing out through the hatch opening, due to the ventilation pressure difference across the seal.

Mine conditions

Atmospheric conditions

In the course of responding to the 'high high' level methane alarm, the MSO and the VO walked towards the 901 District and identified the source of the high methane as the 901 tailgate B Heading seal. The methane levels at the approach to 20 cut through overcast were 3.70% and on the other side were in excess of 4.00%. On the other side of the overcast the atmosphere exhausting from the airlock was in excess of 5.00% methane.

Changes in barometric pressure can influence the gas pressures in the mine, particularly in relation to methane gas concentration. It is usual for barometric pressure to fluctuate throughout the course of a day. The incident occurred during the pressure low of the daily cycle. On the day of the incident, the prevailing weather conditions also caused the barometric pressure to drop.

The aim at a goaf seal is to have a minimal pressure differential across the seal. This prevents the ingress of oxygen into the goaf or, conversely, the leaking of goaf gasses into the mine workings. A falling barometric pressure creates a condition for higher gas pressure on the goaf-side of seals. This can lead to the goaf gas passing through seals into areas of lower gas pressure (i.e. the mine workings).

However, whilst the pressure relief slide at 20 cut through A-B Heading was open, there was no engineering arrangement to induce the air to draw in to provide pressure relief for the seal at 0-1 cut through B Heading 901 tailgate.

The 20 cut through overcast was set up so that the airlock on the intake side of the overcast was fully open with the intent to ventilate the seal site. The Standard Operating Procedure (SOP) for ventilation required the seal site to be positively ventilated. The pressure relief side in 20 cut through A-B Heading stopping was open, but there was no brattice wing or arrangement to induce the air drawing through the pressure relief slide to ventilate the seal site. Therefore the seal site was at the same ventilating pressure as the main return.

This in effect created a measured pressure across the seal of approximately 400 kpa. This would not be considered normal for a goaf seal. If someone were to open a hatch on a goaf seal one would not expect to be pushing against 400 kpa (the hatch was set up to open inwards to the goaf, against the flow of ventilation if it were opened). The effort required to push the hatch open was akin to using a door to access through a ventilation stopping.

Once the door was forced open a ventilation path was created by drawing air through the 2 cut through hatch up B Heading and out over Mr McGuire, bringing the inert atmosphere with it.

Mine layout

The Grasstree mine is distinct from most underground coal mines in that the main workings of the mine have been joined to the workings of a large, older mine (now named Grasstree West). The numbering from Grasstree West was carried over to some of Grasstree mains. There are also many cut-throughs that have not been driven across all the headings in the Grasstree mains pit bottom area which has made consistent numbering of cut-throughs difficult to administer. The arrangement can be confusing and it is possible for CMWs to mistake their location in this area of the mine.

The investigation found that the signposting of cut through locations was inconsistent.

At the time of the incident Mr McGuire did not have a plan of the area in his possession. The mine had a system in place for familiarising CMWs to areas of the mine prior to commencing work in that area. There are no records to confirm Mr McGuire's familiarisation to that area of the mine.

Risk management

Planning

The Grasstree Mine had a risk management system in place at the time of the incident. It comprised four levels of risk assessment for:

- major hazard or full site risks, tools such as event trees were used to analyse and minimise risk
- project risks, change management and particular issues, a workplace risk assessment and control system was used
- routine and non-routine task planning the mine used a Job Risk Analysis approach
- individual worker tasks and environmental assessment of hazards, the mine used the SLAM (Stop, Look, Assess, Manage) tool.

There is evidence that all of these systems were practiced at the mine however there are incidences of lapses or a lack of diligence in the application of systems surrounding this incident.

While the mine had given notice under section 326 of the Coal Mining Safety and Health Regulation 2001 (the Regulation) to the mines inspectorate of its proposed sealing plan; and had received acknowledgement that the mines inspectorate was satisfied with the details of the proposed sealing pursuant to section 327 of the Regulation; it remained the responsibility of the mine to assess the risks associated with sealing and manage those risks to an acceptable level.

In relation to the sealing of 901 Longwall, the change in design between the risk assessment and the plan to install hatches in some seals was not signed off as required in the mine's Safety and Health Management System.

The intention of the mine management was to have the sealing of 901 completed by 17 March 2014. On 17 April 2014 the mine detected oxygen in the goaf in the inbye end of the block. Investigations revealed that this was induced by ventilation pressure in the inbye end of the goaf. This situation caused the sealing to be prolonged to the point where the goaf was still in the sealing phase and bleeding gas into 2 cut through 901 C-B Heading tailgate at the time of the incident.

Importantly, the 901 sealing schedule planned to have the goaf sealed by 17 March 2014. Final sealing had not been effected at time of incident due to oxygen ingress into the goaf. Had the sealing plan been followed and completed, final sealing would have been achieved and the door would have been fortified, removing the possibility of inadvertent access.

The sealing plan risk assessment also only identified the consequence of CMW exposure to high gas levels as an "insignificant risk". Should the risk assessment have recognised a higher risk level (such as a single fatality consequence) the sealing plan may have been different to reflect the higher risk.

The investigation also found that the work force involved in the sealing plan risk assessment included an ERZ Controller from the longwall coal face only. The inclusion of an Outbye ERZ Controller may have assisted in recognising a higher level of risk of CMW exposure to high gas levels.

Further, while mine vehicle doors were locked to prevent entry into an ERZ by vehicles, hatches to prevent entry by CMWs into the goaf were closed using only a nut and bolt mechanism which could be easily released with a shifting spanner that is commonly carried by CMWs. As the mechanism

didn't lock, it was not adequate to prevent CMW entry to an ERZ. Nor was the door signposted as ERZO as required by Regulation.

A Job Risk Analysis performed in 2008 considered some of the hazards associated with the calibration of gas detectors. Among the hazards identified were the:

- inability to access required areas
- presence of methane in excess of 0.50%
- failure to identify increased gas levels.

The Job Risk Analysis also concluded that completion of the task required two people.

The relevant controls in the Job Risk Analysis included planning of tasks and their inclusion in the 24 hour plan, and a requirement to carry a Portable Gas Detector. Neither of these controls were in place or utilised for Mr McGuire's task.

The urgency surrounding the task is also relevant. The gas detector calibration work was required to be completed on the day of the incident in order to maintain statutory compliance. It is possible that the deadline influenced the decision to have the task completed despite it not being adequately planned (i.e. not included in the mine's 24 hour plan).

The SLAM process is designed to incorporate risk awareness into the natural decision making of CMWs. It is designed to be undertaken prior to each task to induce a CMW to consider what could go wrong. There were no entries in Mr McGuire's SLAM book which was with him at the time of the incident. This suggests that he did not conduct a SLAM for his tasks on that day.

Supervision

A 24 hour plan is commonly used as a communication tool for shift management from various departments of the mine. Mr McGuire's gas detector calibration work was not documented in the 24 hour plan for 6 May 2014. Had the work been documented in the plan, supervision arrangements for Mr McGuire entering return airways could have been considered by the MSO and an ERZ Controller tasked with bag sampling of 901 seals could have accompanied Mr McGuire.

Mr McGuire entered the 901 tailgate unsupervised. There was no requirement for direct supervision provided the area had been inspected and deemed safe by an ERZ controller. An inspection and determination of safety by an ERZ controller was valid for 6 hours (6 hours was sufficient time for a changeable environment such as 901 tailgate to vary from a safe state to a heightened level of risk). At the time of the incident more than 6 hours had elapsed since the last ERZ Controller inspection (at 6.50am).

An ERZ Controller (who was not available that shift to accompany Mr McGuire), stated during the investigation, that he normally would accompany a CMW into return airways as *"too many things could go wrong".*

The investigation revealed a number of flaws in the Job Card system. As it operated, the system utilised a number of different supervisors who were not necessarily familiar with one another's roles. This allowed a situation to ensue whereby no single individual had responsibility for overseeing the whole of the gas monitoring system.

For example, the Long Term Planner was responsible for the data in the system, the process for allocating maintenance work was managed by the Outbye Electrical Coordinator and the process for relocating detectors was the responsibility of the Ventilation Officer. The investigation identified that

the Long Term Planner was unaware of the authorisation form process to move gas monitoring detectors and was therefore not updating the Job Card system with the latest information.

The history of Job Cards containing incorrect location data in relation to the Station 3 and Station 5 detector suggests inaccurate record keeping was culturally normalised, particularly among CMWs. This may have led Mr McGuire to doubt that the Station 5 detector was in a goaf.

There were a number of non-permanent supervisors operating in critical management roles at the time of the incident, including the Electrical Engineering Manager, a contract VO, the night shift MSO and the dayshift MSO.

The investigation also found that mine documentation used inconsistent terminology. For example, in documents reviewed by the Mines Inspectorate, the gas monitoring detector at Station 5 is also referred to as the Environmental Station/Bypass Station and the iMAC station. This inconsistency may introduce risk through confusion of the actual location.

Training

The Grasstree mine had no formal process to train electricians on how to conduct the calibration of gas monitoring detectors. The mine relied on an experienced electrician teaching a new electrician on the job. There was a Job Risk Analysis covering calibration of gas monitoring detectors work but no evidence was found that Mr McGuire was trained, assessed or familiar with the Job Risk Analysis.

The mine had a system for familiarising CMWs with areas of the mine. When a CMW was deployed to an unfamiliar area of the mine the intent was to train and assess the worker as competent to enter and remain in the area. A “Grasstree Underground Outbye Familiarisation” was required to work in the 901 District. There was no evidence that Mr McGuire was trained or assessed in the document.

Emergency response safety

Officers in the control room assumed that the ‘high high’ alert received in the control room was related to a faulty detector and determined that the acting EEM should investigate. In doing so, the EEM entered a return airway that was not under a current ERZ Controller inspection. After replacing the detector, the acting EEM concluded that the alarm was due to elevated gas levels and it was determined that the MSO and the VO should investigate the nature of the elevated gas levels.

Grasstree mine’s Gas Management Trigger Action Response Plans indicated that a main return airway with greater than 2.50% methane should activate a withdrawal of personnel from the mine. The data from the Personal Gas Detector of the EEM showed a peak of methane of 1.86%. The data from the Personal Gas Detector of the MSO showed a peak of methane in excess of 5.00%.

When responding to the ‘high high’ alert no one was aware that it was triggered as the result of a serious incident. In addition to the ‘Trigger Action Response Plans’ action requiring a withdrawal of personnel from the mine when a main return airway registers in excess of 2.50% methane, safety systems such as being accompanied, having ERZ Controller inspections of return airways and the use of Personal Gas Detectors were not all adhered to and risked the safety of the first responders.

Conclusions and recommendations

Conclusions

The investigation concluded that:

- On 6 May 2014, Mr McGuire was provided with a Job Card that directed him to perform electrical maintenance work at a location that was within a goaf
- The provision of the Job Card to Mr McGuire caused him to open the hatch
- Mr McGuire was immediately exposed to the irrespirable atmosphere present behind the seal and died of asphyxiation as a result of opening the hatch
- Grasstree mine should have ensured the development and implementation of a procedure that ensured that the Job Card system contained correct information about the location of gas sensors and goafs at the mine so that Mr McGuire was not directed to perform electrical work within a goaf.

The investigation identified a number of errors and omissions in the management of risk surrounding the incident. Broadly, they can be grouped as failure in planning, supervision and training.

Planning:

- The mine's plan for sealing 901 Longwall was inconsistent with its risk assessment;
    - It also failed to consult with a relevant cross-section of CMWs involved in carrying out tasks under the proposed standard operating procedure to identify the hazards associated with the task and ways of controlling the hazards.
    - It also incorrectly identified the risk of CMW exposure to high gas levels as insignificant.
- The planned Job Risk Analysis for gas detector calibration was not adhered to;
- Mr McGuire's gas detector calibration work was not included in the days' 24 hour plan;
- The calibration of the gas detectors was left until the final day before the statutory requirement for compliance lapsed; and
- The SLAM process for CMWs to assess their own safety wasn't followed.

Supervision:

- The Job Card system lacked a single supervisor which led to errors in the system (including up-to-date locations of gas sensors) and possibly a lack of faith in its integrity;
- There were a number of non-permanent supervisors working during the shift when the incident occurred; and
- Mr McGuire was not accompanied in the return airway;
- Documentation utilised inconsistent terminology, creating the opportunity for confusion.

Training:

- The mine had no formal process for training electricians in the calibration of gas detectors; and
- There was no evidence that Mr McGuire had received familiarisation training for the 901 Longwall District.

The response to the 'high high' alert, which ultimately became the emergency response, also created its own safety risks. The mine's response put further workers at risk:

- by the first responder not being accompanied;
- for the failure to have working Personal Gas Detectors;
- entering a return airway not under current ERZ Controller inspection; and
- for remaining in an area that was registering methane gas levels well beyond those considered safe.

The Mines Inspectorate determined that there were 21 cases of non-compliance to the Act in both the lead up to the incident and the response to the 'high high' alarm.

Recommendations

In addition to pursuing formal compliance action, including prosecution, the Mines Inspectorate made recommendations aimed at improving the safety of CMWs.

It recommended that in relation to planning:

- The mine implements controls to prevent inadvertent access into areas that may contain irrespirable atmospheres;
- The mine determines and specifies a pressure difference across stoppings at which an airlock must be installed to facilitate ease of access, and conducts an audit of the mine and upgrades all stoppings which exceed this pressure differential;
- The mine signposts all potentially irrespirable areas in the mine as "Dangerous and not to be accessed";
- The mine reviews risk management processes to ensure a relevant cross section of the workforce is included in the risk assessment phase; and
- The mine ensures that the change management processes at the mine are reviewed and used when required.

In relation to supervision:

- Appoint a member of the senior management team to be responsible for the gas monitoring system, to oversee all activities associated with the system;
- Revise the MSO handover process so that all information is communicated effectively to the oncoming shift personnel and records kept so that the process can be reviewed and improved when required;
- Update the 24 hour plan process to ensure that all necessary information is included to allow the supervisors on the shift to make well informed operational decisions;
- Upgrade the Job Card system so that there is sufficient information to enable the intended work to be completed safely and efficiently; and
- Review the process of CMWs accessing return airways unaccompanied by an ERZ Controller to ensure the process is conducted at an acceptable level of risk.

In relation to training:

- All CMWs who undertake gas monitoring calibration at the mine be appropriately trained, assessed as competent and authorised; and
- Review the training scheme at the mine and ensure that all CMWs required to undertake tasks are assessed as competent where applicable.

Action

Following a Nature and Cause Investigation of the accident and consideration of all the evidence, the Department prosecuted the Mine Operator in the Industrial Magistrates Court under section 34(b) of the Act, for failing to discharge a safety and health obligation, causing death.

The prosecution alleged that the Operator failed to discharge its obligation under section 41(1)(b) of the Act, namely *"to ensure the Operator's own safety and health and the safety and health of others is not affected by the way the Operator conducts coal mining operations".*

The Operator pleaded guilty to the charge and was sentenced on 23 November 2016. It was fined $137,500 with no conviction recorded.

In sentencing the Operator, the Magistrate stated that he viewed the breach as *"a very serious matter".* The magistrate said:

> *"It is almost incomprehensible to understand the systems of the mine were in such a shoddy state that the executives of the mine say that they were not even aware of the deficiencies in their own system … Simply complying with their own standards would have sufficed. Their basic failures have cost the man his life."*