Investigation information release

Date: December 2022

Outburst at NSW underground coal mine.

Incident date: 28 November 2022

Event: An outburst occurred while developing an underground roadway through a geologically disturbed area during remote mining operating conditions. There were no injuries.

Location: Appin Colliery

Overview

This outburst is the third outburst reported in the last 20 metres mined in this roadway and was the largest of the 3. This area was geologically disturbed and was unable to have the insitu gas content reduced to below outburst threshold levels.

The mine

Appin Colliery is about 36 kilometres north-west of Wollongong, NSW. The mine is an underground coal mine that produces coking coal. Endeavour Coal Pty Limited is the mine operator of the Appin Colliery.

The incident

The crew was cutting coal with a continuous miner under remote operating conditions from the remote operating station (ROS) underground in the panel on 28 November. They were mining in A heading at 75 metres inbye of the last cut-through. At 8.36 pm, the auxiliary fan ventilating the face area and the continuous miner tripped.

The continuous miner driver later reported that his remote mining camera screens went blank. Another crew member later reported seeing material and dust from the left side of the face camera.

The methane (CH_4) and carbon dioxide (CO_2) real time gas monitors on the right-side rib adjacent to the continuous miner both peaked at more than 5% and flat lined. The real time methane gas monitor for the panel return located about 200 m outbye of the auxiliary fan was more than 2% methane for 11 seconds, peaking at 2.2% methane general body.

At 9.30 pm, degassing of the A heading commenced using centreline brattice with the heading being degassed by midnight and the auxiliary ventilation re-established to face.

The panel deputy confirmed an outburst had occurred and the scene was secured.

The deputy reported a small coal slump on the right side and an outburst cone was evident in the left side of the face about one metre diameter and 2.5 metres deep. Roof material had fallen out to about 400–800 mm across heading, higher cavity bias towards the centreline.

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The incident was notified to the Resources Regulator on 29 November 2022 and an inspector was sent to attend the site.

The investigation

This outburst was the third and largest outburst in this area of mining.

The area crossed a 1.3 metres to 1.7 metres thick dyke zone about 80 degrees to the heading as well as a strike slip fault sub parallel to the heading about 25 degrees.

The general area gas content was generally 15 m^3/t made up of methane and carbon dioxide at carbon dioxide ratio of 50% to 60%.

Figure 1: Original geology prior to A heading outbursts

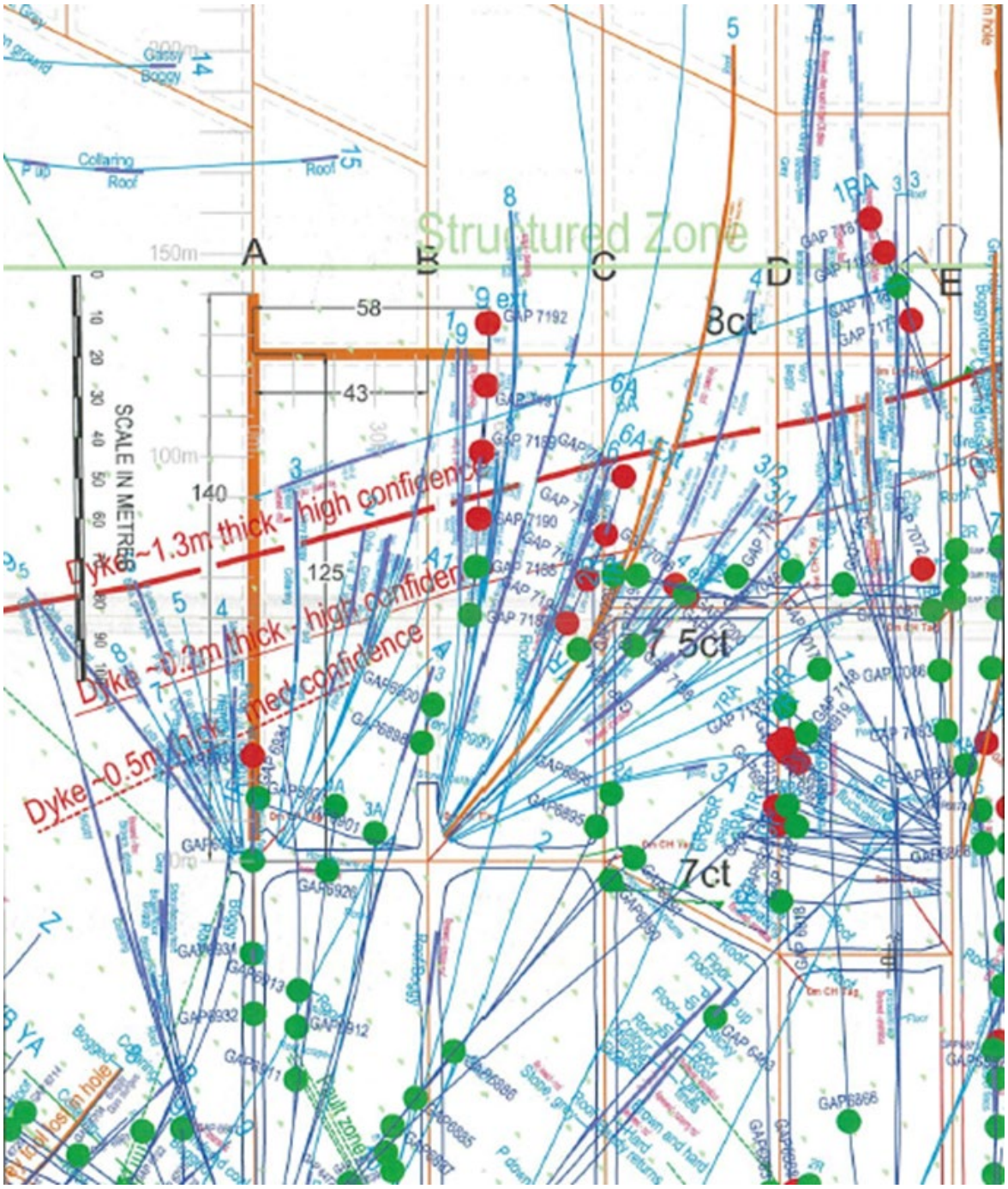
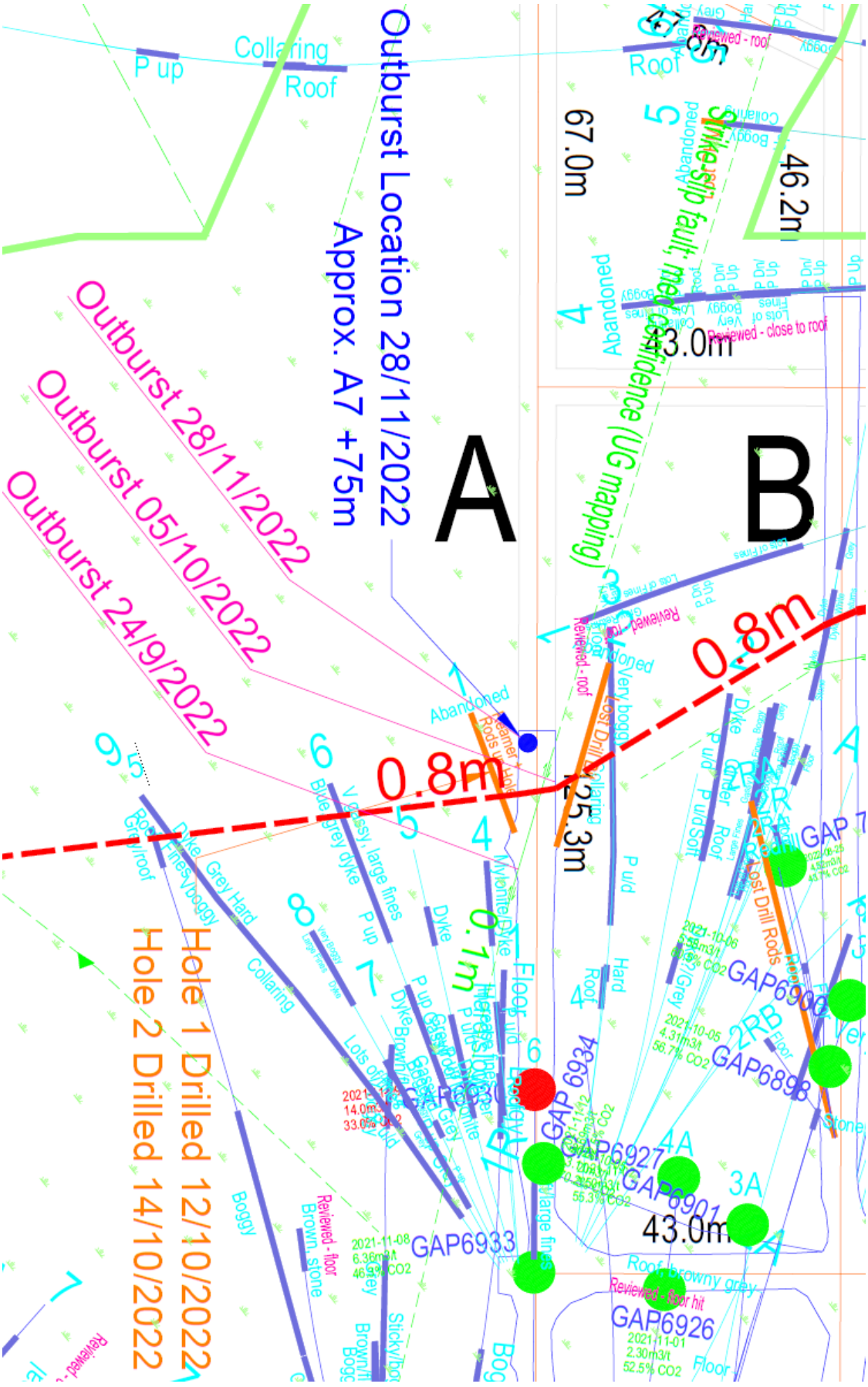


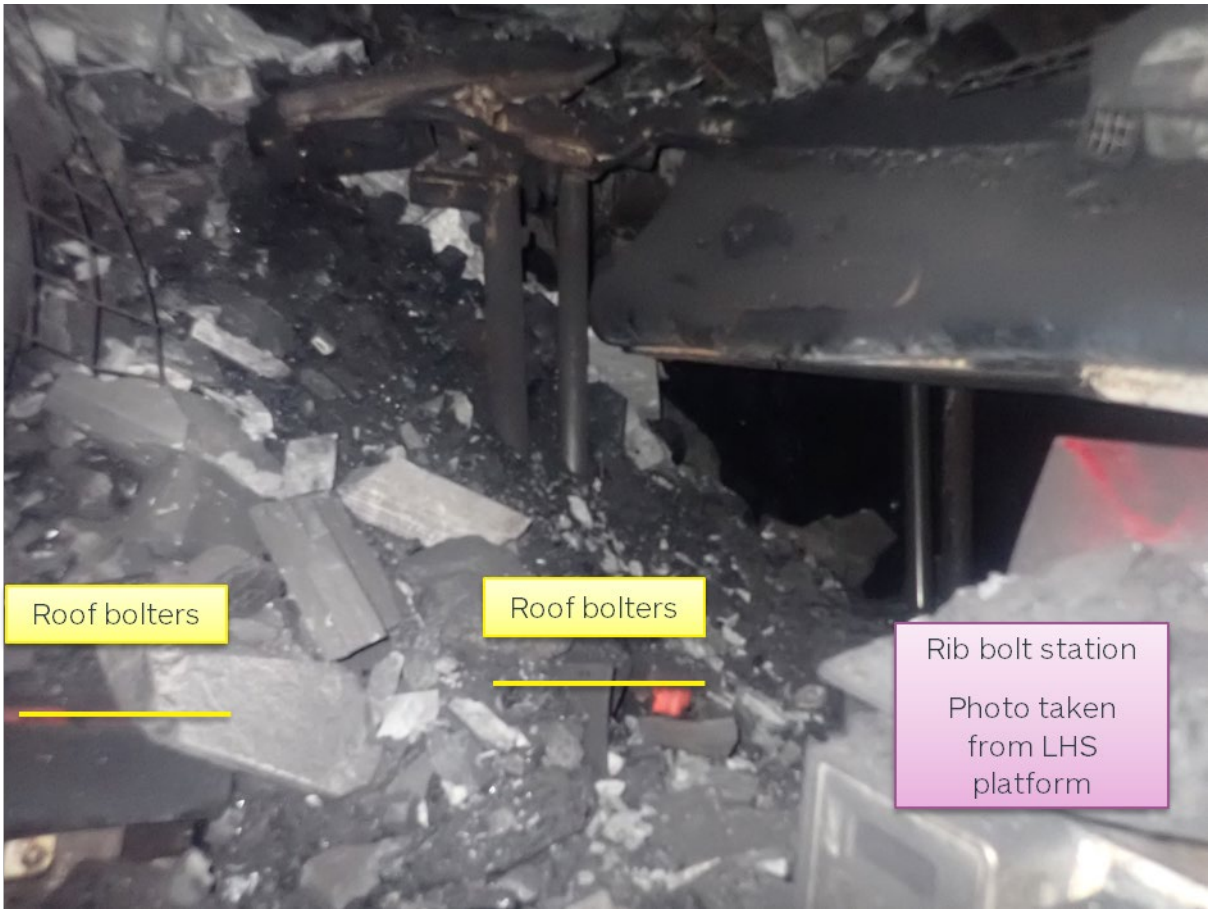
Figure 2: Sites of 3 outbursts showing updated geology



Event 1 – 24 September 2022 at A7 + 57.2m

- A remote outburst occurred while mining more than 14 m^3/t.
- About 5-8 tonne (estimate) material was ejected.
- Material was thrown up to 2 metres on the left-hand side of continuous miner.
- A gas release caused the auxiliary fan to trip.
- The maximum methane level in the return was 1.37% (note the return was part of no-go zone).
- Total gas released was 915 m^3 (530 m^3 methane and 385 m^3 carbon dioxide).
- The area was highly structured and essentially undrained.
- A small dyke at the outburst site (estimated from drilling) was not present – a small slip/strike fault was present.

Figure 3: Event 1. Left-hand side of miner showing roof bolter positions and burst material



Event 1 - Review of control measures

- The inspector who assessed the incident considered that the remote mining controls which were in place at the time were effective.
- A geological and geotechnical inspection and appraisal identified jointing, strike/slip fault. There was no evidence of a small dyke or cinder and no evidence of outburst cone.
- A revised authority to mine (ATM) was issued with a predicted small dyke removed from the reissued ATM.

Event 2 - 5 October 2022 at A7 + 69 m

- An outburst occurred while remote mining coal with a gas content of more than 14 m^3/t.

- About one tonne of coal was ejected.
- Material thrown up to 4.5 metres from right-hand side corner to the left, with no coal being thrown over the continuous miner.
- A methane gas release caused the auxiliary fan to trip.
- The maximum methane level in the return was 0.63% (note the return roadway was part of no-go zone).
- Total gas released was 298 m^3 (163 m^3 methane and 135 m^3 carbon dioxide).
- The area was highly structured, and essentially undrained.

Figure 4: Event 2 view of small outburst on right-hand side of heading

Event 2 - Review of control measures

- The inspector who assessed the incident again considered that the remote mining controls which were in place at the time were effective.A geological and geotechnical inspection and appraisal identified jointing, strike/slip fault, confirmation of main dyke zone and a small outburst cone.
- A decision was made to drill 2 inseam gas drainage flank holes in A heading.
- The left-hand side flank hole was drilled to 20 metres and drill rods were bogged.
- The right-hand side flank hole was drilled to 28 metres and drill rods were bogged.
- A revised ATM was issued to mine B heading, while the 2 inseam gas drainage flank holes in A heading were being drilled.

Event 3 - 28 November 2022 at A7 + 75m

- An outburst occurred whilst remote mining coal with a gas content of more than 14 m^3/t.
- About 8 tonne of coal was ejected from the void.

- Material slumped off RHS rib area. Three shuttle cars' worth of material was removed from in front of the loader blade (combination of roof, face, void, and coal cut during sequence. No large blocks or fine coal were present on platforms. The boom of the miner had small amounts of material build-up and the head of the miner was buried under coal and roof stone.
- A methane gas release caused the auxiliary fan to trip.
- The maximum methane level in the return was 2.2% methane general body. (note return part of no-go zone).
- Total gas released was 1568 m^3 (878 m^3 methane and 690 m^3 carbon dioxide).
- The area was highly structured, and essentially undrained.

Figure 5: Event 3. View of left-hand side face cone after material cleaned out

Figure 6: Event 3. View of left-hand side cone after strata support installed

Event 3 - Review of control measures

- As per the previous two events, the remote mining controls were considered to be effective in managing the risk to workers.
- A geological and geotechnical inspection and appraisal identified jointing, strike/slip fault and outburst cone. Further inspection due following advancing A heading face beyond the current outburst cone.
- A revised ATM was issued to mine the inbye section of A heading only.
- The mine revised the return airway contamination plans/dilution models and exclusion zones related to remote mining operations.
- Assess the capability for the remote operating station cameras to record footage and the auxiliary fan trends to be recorded for replay.

Additional relevant information:

- Panel ventilation:
  - 48 m^3/s was available in the panel.
  - The exhaust auxiliary fan 22 m^3/s OC. VIV set at 17 m^3/s. Ventilation duct 718 mm and 618 mm diameter to face with slider tube. 10 m^3/s measured behind miner in A heading.
  - Centre line brattice was hung from the roof as preparation for degassing issues.
- Gas intertripping processes on equipment occurred as designed in each incident.
- E heading was mined through the dyke first on remote mining procedures to conduct inseam gas drainage drilling activities on the inbye side of the dyke structure. There was one event in which methane tripped the auxiliary fan and continuous miner and required face degassing. An exceedance of 2% methane was reported. No outburst was observed.
- B heading was mined through the dyke without any issues following a second small outburst in A heading.
- A heading progressed on remote mining procedures through this area and 3 outburst incidents were recorded within a 20 metre section.
- Distances driven in A heading over the previous 24 hours:
  - 0.5 metre during afternoon shift on 28 November 2022 (incident shift)
  - 3 metres during day shift on 28 November 2022
  - 1.5 metre during night shift on 28 November 2022

Remote mining operation

At Appin, current management plans stipulate that remote mining is conducted when the coal to be mined is unable to be drained to below outburst threshold values.

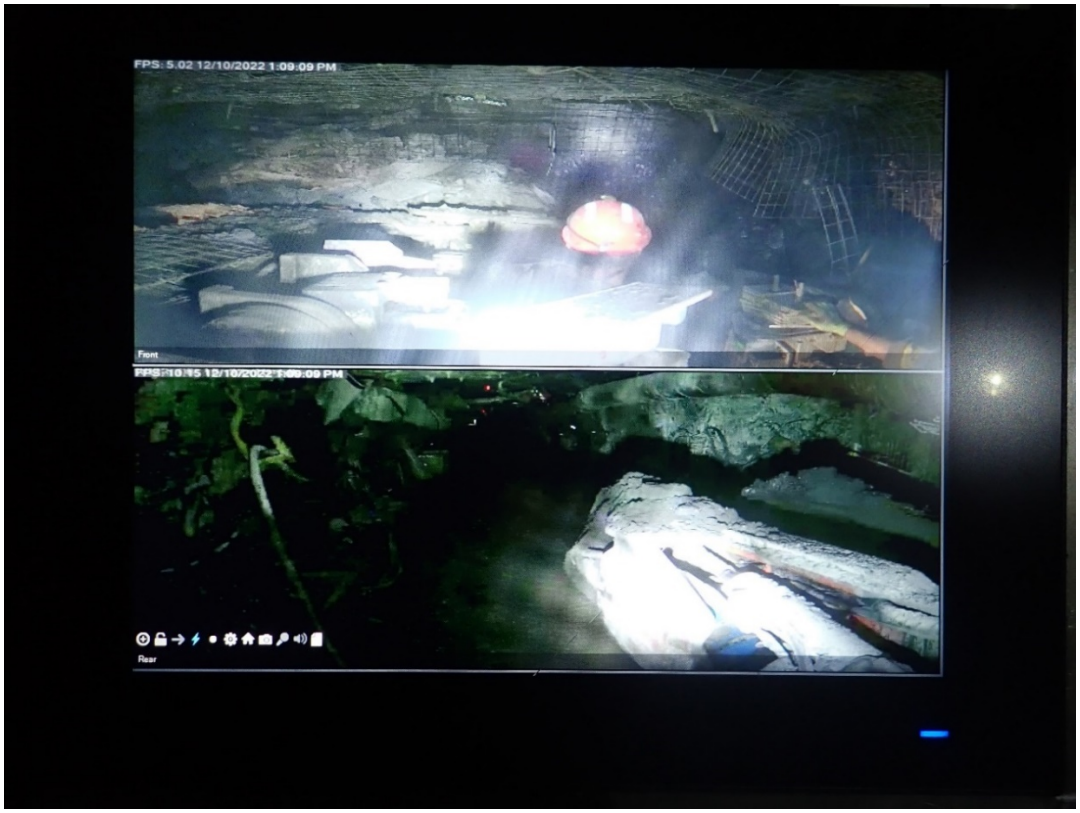
Appin remote mining incorporated:

- remote mining of coal using an MB650 single pass miner and shuttle car
- a remote operating station (ROS) incorporating visual, and data logger displays from where the continuous miner was operated, and the face environment was monitored. The ROS was also equipped for communications to control, the panel deputy's station, fresh air base (FAB), and the face area. The ROS must be located outside the hazardous zone in the panel.
- A FAB where the location of emergency response equipment was positively ventilated by intake air such that the FAB would not be contaminated by any irrespirable atmosphere in the event of an outburst.

- Procedures were developed to manage all aspects of the process including the remote crew make up, roles and responsibilities, communications, monitoring, access, and emergency response.

Figure 7: Inside view of ROS station showing operating screens

Figure 8: ROS station view from cameras on the miner.



The importance of elimination of the risk through gas drainage should never be replaced by remote mining but used in conjunction with each other.

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About this information release

The Regulator has issued this information to draw attention to the occurrence of a serious incident in the mining industry. Further information may be published as it becomes available.

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