

INVESTIGATION INFORMATION RELEASE

DATE: 12 APRIL 2019

Workers evacuated after gas levels rise

Event: Causal investigation

Location: Metropolitan Colliery, Helensburgh, NSW

Overview

Seventy workers were withdrawn from an underground coal mine in Helensburgh, south of Sydney, on 21 March 2019 after carbon dioxide and methane levels increased unexpectedly to hazardous levels.

A supervisor on the longwall face initially detected increasing gas levels that appeared to be coming from floor cracks.

Supervisors continued to monitor gas levels, and when gas levels continued to increase the decision was made to withdraw workers and remove power to the underground parts of the mine in accordance with mine procedures.

Remote gas monitoring systems indicated levels in the longwall return airway and the main return airway continued to increase. Peak levels measured 16.1 per cent methane and 15.9 per cent carbon dioxide in the longwall return airway, and 4 per cent methane in parts of the main return airway.

Workers remained out of the mine for seven days until carbon dioxide and methane levels returned to non-hazardous levels.

The NSW Resources Regulator has begun a causal investigation in collaboration with the mine operator Peabody Energy - Metropolitan Colliery and worker representatives.

While the investigation is ongoing, inquiries to date have identified that:

- the most likely source of the gas release was from underlying undrained coal measures that contain carbon dioxide and methane
- no apparent faulting or fault-related characteristics were identified within the mine's geological mapping that may have provided a connection to the underlying coal measures.

The mine

Metropolitan Colliery is owned and operated by Peabody Energy and is a coking coal operation about 45 kilometres south of Sydney, with a workforce of about 410 people. The mine works the Bulli seam and produces about 2 million tonnes ROM per annum. The bulk of this is high quality coking coal primarily used for steel making in blast furnaces, both in Australia and overseas.

The area of the Bulli seam that the mine operates in has high carbon dioxide gas content, and the mine has a history of areas above outburst threshold levels. The mine uses in-seam gas drainage to lower the gas levels to safe limits.

The incident

Events on 21 March 2019

Longwall deputy requests undermanager to attend longwall due to increased carbon dioxide levels

Production in longwall 303 panel was stopped at 6 pm on 21 March 2019 due to elevated levels of carbon dioxide at the tailgate monitoring point. The longwall deputy went to the tailgate and adjusted the brattice ventilation wing and was called to mid-face by an operator. It was noted that the carbon dioxide level was above the measuring range of his hand-held gas detector. Moving to the maingate, the two workers heard “hissing” sounds behind the shields, and all shields along the face were yielding. No methane was detected at this time.

The undermanager and the longwall deputy began to inspect the face about 6.50 pm. At number 20 shield, their gas detector alarmed with 2.21 per cent carbon dioxide and detected 0.7 per cent methane. They also saw gas bubbling from the floor.

Acceptable gas levels in NSW mines is no greater than 2 per cent¹ for methane and within normal air mix for carbon dioxide².

Control room tells undermanager that gas levels in longwall return are increasing

The undermanager and longwall deputy obtained updated information from the control room on the increasing methane and carbon dioxide levels in the return airways.

Methane levels at the tailgate methane monitor increased to greater than 1.25 per cent 10 minutes later, automatically tripping the electrical power to the longwall face. The undermanager checked the measurement from the tailgate methane monitor at the display in the maingate and noted the tailgate monitor had increased to 2.31 per cent methane. His hand-held gas detector was measuring 0.7 per

¹ Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 clause 72 Control and monitoring of methane levels

² Carbon dioxide in coal mines exposure standard <http://hcis.safeworkaustralia.gov.au/ExposureStandards/Document?exposureStandardID=109>

cent methane in the maingate. The longwall crew and undermanager withdrew to the crib room and the undermanager contacted the mining engineering manager and ventilation officer.

Withdrawal from underground begins

The undermanager started the withdrawal of workers from the mine at 7.15 pm.

The deputy isolated power to the longwall district at 7.33 pm and at 8 pm all underground conveyors were turned off.

After confirmation that all workers were withdrawn and accounted for, underground electrical power was isolated at 8.50 pm.

The incident response

Following the safe withdrawal of workers, the mine formed an incident management team and notified the incident to the NSW Resources Regulator, who deployed an inspector to site.

The inspector issued a section 195 prohibition notice preventing workers from returning underground until gas levels returned to safe levels. A further section 195 prohibition notice was issued, prohibiting the resumption of longwall mining activities until the source of the release was identified and control measures were established to manage the risks associated with any potential gas release.

The measured carbon dioxide concentration, detected by the tube bundle gas monitoring system in the longwall return, reached a peak of 15.9 per cent at 8:32 pm. The measured methane concentration peaked at 16.1 per cent at 9:08pm.

Gas levels in the main return airways of the mine were continuously monitored and decreased over six days. Following a risk assessment, the mine undertook a limited re-entry on the afternoon of 27 March 2019 to increase ventilation to the longwall ventilation circuit.

As a result of the ventilation change, methane levels in the longwall return dropped below 2 per cent and stabilised around 1.7 per cent, indicating that gas was still being released.

The initial investigation suggested that a substantial floor break, originating in the goaf of longwall 303, allowed gas from underlying coal measures to migrate into the working seam. The quantity of gas was significant, and the rate of the release overcame the capacity of the mine's ventilation system.

Gas monitoring systems continue to monitor the mine atmosphere at points throughout the mine.

Causal investigation

A causal investigation team, comprising representatives from the mine operator Peabody Energy - Metropolitan Colliery, worker representatives and the NSW Resources Regulator, was established on 2 April 2019 to investigate the circumstances that required the unplanned withdrawal of workers from the mine and the reasons for the prolonged period required to establish safe mine re-entry conditions.

This includes the identification of deficiencies in procedures, equipment and training that may have contributed to the exposure of hazards to workers or other people.

The scope of the causal investigation includes, but is not limited to, the:

- identification of the source and magnitude of the gas release and the failed or absent controls that may have prevented or mitigated the incident
- effectiveness of the implementation of the mine's response plans
- effectiveness of gas monitoring systems from the time of the gas release to re-entry
- management of risks to critical surface infrastructure, both private and public, during the event – in consideration of elevated levels of CO₂ and CH₄ gas being exhausted from the main ventilation fans
- management of risks during the re-entry to the mine.

The purpose of the causal investigation is to determine the cause and circumstances of an incident and provide timely dissemination of information about the cause and circumstances. The investigation is being undertaken using the Incident Cause Analysis Method (ICAM) framework, with human factors analysis to be conducted where appropriate. The causal investigation team will consider:

- the causal circumstances of the incident, including an incident timeline
- maintenance of critical controls
- human and organisational factors
- the regulatory environment in which the incident occurred
- recommendations for the mining industry to prevent a similar incident reoccurring
- recommendations for the NSW Resources Regulator to assist with better regulation.

The causal investigation team may also consider:

- previous incidents of a similar nature
- reasonably practicable control measures
- what prevented the risk manifesting as a serious injury or illness (what controls worked or what went right)
- any other factors, where appropriate.

The NSW Resources Regulator will not be considering further enforcement action in relation to this incident, unless a significant breach of work health and safety legislation is observed, where:

- reckless conduct is observed or
- false or misleading information is provided about the incident.

An investigation report will be prepared for the Secretary of the Department of Planning and Environment at the completion of the investigation.

Recommendations

Analysis of the causal factors involved in this incident are continuing. Mine and petroleum site operators are reminded of their duty to identify hazards and manage risks to health and safety in accordance with the provisions of the *Work Health and Safety Act 2011* and *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and Regulations.

The circumstances of this incident should prompt mine operators to review their safety management systems, focusing on:

- managing the gas reservoirs around extraction panels
- withdrawal trigger action response plans (TARPs)
- post incident monitoring
- re-entry procedures
- workers' access to return airways during extraction activities
- the determination of acceptable methane levels passing through the ventilation fans
- management of ventilation fan exhaust gases around surface infrastructure.

Further information

This investigation is continuing. The NSW Resources Regulator will issue a final report once analysis of all available evidence is complete.

About this information release

The NSW Resources 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.

Go to resourcesregulator.nsw.gov.au to:

- learn more about our work on causal investigations and emergency response
- view our publications on other causal investigations

© State of New South Wales through the NSW Department of Planning and Environment 2019.

This publication is copyright. You may download, display, print and reproduce this material in an unaltered form only (retaining this notice) for your personal use or for non-commercial use within your organisation. To copy, adapt, publish, distribute or commercialise any of this publication you will need to seek permission from the NSW Department of Planning and Environment.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (May 2019). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the NSW Department of Planning and Environment or the user's independent advisor.

DOCUMENT CONTROL

CM9 reference	DOC19/318953
Mine safety reference	IIR19-02
Date published	12 April 2019
Authorised by	Chief Inspector Office of the Chief Inspector