

WRITTEN EXAM | CERTIFICATE OF COMPETENCE

Undermanager of underground coal mines

Summary of written exam

Examination Date: 1 April 2016
Number who passed: 5 out of 19
Highest mark obtained 87%
Average overall mark: 58%
Lowest overall mark: 22%

UB1 – Mining legislation

Legislation assessed:

Work Health and Safety Act 2011
Work Health and Safety Regulation 2011
Work Health and Safety (Mines) Act 2013
Work Health and Safety (Mines) Regulation 2014

Question 1 (20 marks)

List the principal mining hazards outlined in Clause 5, Meaning of principal mining hazard Work Health and Safety (Mines) Regulation 2014.

Question 2 (20 marks)

List the requirements of Clause 14 Contents of safety management system - Work Health and Safety (Mines) Regulation 2014

Question 3 (20 marks)

Work Health and Safety Act 2011 - Division 2, Clause 19. Primary duty of care
What must a person conducting a business or undertaking ensure?

Question 4 (20 marks)

Work Health and Safety (Mines) Regulation 2014

Division 5, Subdivision 2 - All underground mines – air quality and ventilation

- (1) What are the minimum standards for ventilated air as prescribed by “Clause 55 Air quality – minimum standards for ventilated air”? (10 marks)
- (2) Clause 57 - Requirements if air quality and air safety standards are not met.
What are these requirements? (10marks)

Question 5 (20 marks)

Work Health and Safety (Mines) Regulation 2014

- (1) List the requirements under Clause 89 Consultation in preparation of an Emergency Plan (15 Marks)
- (2) Clause 93, establishes the requirements of the Testing of Emergency Plans. What are the testing requirements? (5 marks)

UB2 – Mine Ventilation

Legislation assessed:

Work Health and Safety Act 2011

Work Health and Safety (Mines) Act 2013

Explosives Act 2003

Coal Industry Act 2001

And their supporting regulations

Question 1 (100 marks)

Kato Colliery workings are shown on the attached plan.

The colliery works the “Jacob East” seam, which has a low to medium propensity to spontaneous combustion, is 3.8 metres thick and is overlaid by 6 metres of shale and mudstone. The working section is the lower 3.1 metres of the “Jacob East” seam thickness.

The immediate strata below the “Jacob East” seam, is a 2.5 metre thick reasonably competent bed of sandstone. There are a number of thin coal seams in the overlying strata.

The Kato Colliery workings are accessed via three short portal drivages, into the coal seam outcrop at the base of an escarpment. There is also one 110 metres long, 5.5 metre diameter upcast ventilation shaft which is concrete lined.

The “Jacob East” seam is moderately gassy with a moderate permeability. Total in situ-seam gas content is typically 7 m³/t, with a CO₂:CH₄ ratio of 10:90. Approximately 60% of the in situ gas in the cut coal is liberated during the production process.

Due to the undulating surface contours, the depth of cover for the “Jacob East” seam ranges from 90 metres to 270 metres. A considerable number of low displacement faulted zones exist across the lease.

Typical roof support is 6 x 2.1 metre bolts and a 1 metre x 4.8 metre mesh module per metre. Ribs are friable and prone to failure in the upper third of the rib, requiring support with mesh and 2 x 1.2 metre point anchor bolts every metre.

The mine produces Coking coal from three Continuous Miners in development units seven days per week, and a longwall panel (LW08) five days per week. The mine produces approximately 3.8 million tonnes per year. Two CM's are advancing the Tail Gate headings, whilst a single CM is being used to develop a Main gate road for the new longwall panel LW9.

On the accompanying plan:

- a) Show the location of all the production faces, together with an estimate of their daily production levels. (10 marks)
- b) Ventilate the plan using the code of symbols specified in the Australian Standard AS4368-1996 Mine Plans – Preparation and Symbols. (35 marks)
- c) Document the air quantities you would expect to be entering each production panel measured at the commencement of the hazardous zone. Indicate why these quantities have been chosen. (10 marks)
- d) Based on your assumptions and the data provided calculate the general body methane and carbon dioxide content in the LW 8 panel return whilst the LW is producing coal. Clearly state assumptions you are relying upon in these calculations and why you have chosen these assumptions. (20 marks)
- e) Calculate the main ventilation fan power requirements to ventilate this mine.

Clearly state assumptions you are relying upon in these calculations and why you have chosen these assumptions. (25 marks)

Question 2 (100 marks)

- Using the data supplied in Question 1 and in relation to the mine design / layout as per the attached plan, identify and list the relevant hazards associated with the ventilation of this mine with these conditions. Your answer should include ventilation arrangements, and any other identified major hazard management requirements associated with the ventilation. (40 marks)
- Describe the process of assessing the Hazards you have identified for KATO Colliery and how control methods would be determined. (15 marks)
- Discuss the primary methods you would expect to be implemented at the Kato Colliery for the management of the virgin gas content present and why those methods were appropriate. (12 marks)
- What spontaneous combustion management hazards have you identified for Kato Colliery? (10 marks)
- Describe monitoring arrangements you would expect to be implemented at Kato Colliery, where you would expect to position the monitoring and why you chose these arrangements. (15 marks)
- Discuss what measures you would design into the Spontaneous Combustion TARP (Triggered Action Response Plan) to deal with a heating event. (8 marks)

UB3 – Coal Mining Practice

Legislation assessed:

Work Health & Safety Act 2011

Coal Mine Health & Safety Act 2002

Explosives Act 2003

Coal Industry Act 2001

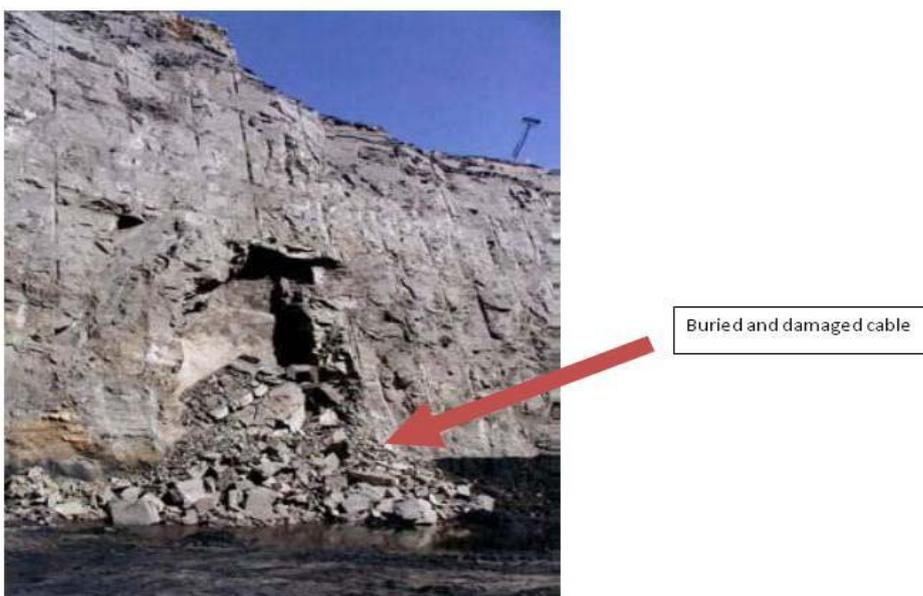
and their supporting regulations

Only five (5) of the eight (8) questions are to be attempted

Question 1 (20 marks)

You are the Night Shift Undermanager at a highwall longwall operation with 3 continuous miners. The mine is moderately gassy, low propensity to spontaneous combustion and moderately wet.

During the shift, all power is lost to the mine site and it is discovered that there has been a highwall failure following heavy rain that has buried the mine electrical supply cable from the adjacent open cut mine.



- What are your immediate actions? (10 Marks)

- b) The Mine Manager appoints you as the Project Manager for re-establishing power supply. Describe the process you would use to complete this (10 Marks)

Question 2 (20 marks)

During the continuous miner underground operations, a methane gas frictional ignition occurred. While completing the final cutting cycle, trimming 300mm of coal tops from the roof, a gas blower was exposed when the cutter head picks came in contact with the stone roof. This resulted in a small flame emitting from the upper right hand side of the working face.

- a) What are mechanisms for Frictional Ignitions to occur on underground mining equipment? (10 Marks)
b) What action would you take to minimise the likelihood of this incident re-occurring? (10 marks)

Question 3 (20 marks)

A new underground mine is commencing the first longwall panel and has a strong immediate sandstone roof. Some of the workforce have expressed concern that there maybe a hazard relating to windblast when longwall mining commences

- a) What are the factors that lead to a hazard of Windblast? (5 Marks)
b) What controls are often considered when addressing the risk of Windblast? (10 Marks)
c) During your shift as the undermanager of the longwall mine, what processes would you go through with the workforce to address their concerns regarding windblast? (5 Marks)

Question 4 (20 marks)

You are the night shift Undermanager. The mine extracts 3m coal from a 3.3m thick seam. The immediate roof consists of 3 to 6m of shale / mudstone overlain by 20m thick conglomerate unit. While inspecting operations in the Mains development panel, you receive a phone call from the longwall deputy that a weighting event has occurred. The roof has fallen in from shield 20 to 95 and stalled the AFC. The AFC chain will not restart.

- a) Describe the actions and directions you would take. (8 marks)

There has been no success in resuming production over 24hrs on the longwall. The chain remains buried unable to run. A 4m cavity has formed from 55 shield to 75 shield yielding sandstone on the chain.

- b) The Mine Manager has assigned you the task to scope up a recovery plan. Describe the way in which you would plan a recovery and the control measures you would put in place to manage health and safety of your employees. (8 marks)
c) Outline the benefits/ restrictions when using a phenolic foam. (4 marks)

Question 5 (20 marks)

You are the afternoon shift undermanager at a moderately gassy longwall mine. You have an additional 12 contractors working on a longwall relocation and 3 development panels. The mine access is via 3 drifts and utilises rubber tyre vehicles.

It is 9pm at night and you are informed by control that smoke has been smelt at the LW recovery face.

- a) Explain the instructions/ actions you would initially undertake. (6 marks)
b) Approx. 10min later, a phone call from the Mains panel informs you that smoke has been smelt and the deputy has 2ppm CO on his hand held detector.
Explain what actions / changes you would make to your instructions / actions. (7 marks)
c) Approx. 30min later, you receive a call from an outbye deputy informing you that he has discovered a moderate sized fire at the main conveyor drive head. He cannot get to a fire depot and is on foot.
What action would you take? (7 marks)

Question 6 (20 marks)

You are on Saturday day shift as Undermanager in a gassy (methane) mine in a seam moderately liable to spontaneous combustion. Due to the high gas emissions, ventilation quantity on the longwall is high with 90m³/s. The longwall mines the lower 3.5m of a 7m thick seam.

Due to extensive gas drainage, mining conditions are dry and dusty.

- a) Explain the process of spontaneous combustion and the principal controls that mines generally apply to mitigate spontaneous combustion risk. (6 marks)
- b) Midway through the shift, the Control Room Operator informs you that CO make is 50 lpm (normal is <21lpm) and Grahams Ratio is 0.6.
Describe the actions / instructions you would take with this information. (5 marks)
- c) On the Monday night shift, a bag sample from the TG General Body has 18ppm CO, 1.5% CH₄, 3ppm H₂, 5ppm Ethylene, 0.5%CO₂ and 19.2% O₂.
Describe and justify the actions/ instructions you would take with this information. (5 marks)
- d) Briefly describe the methods of Inertisation available in Australia to manage a deep seated goaf spontaneous combustion. (4 marks)

Question 7 (20 marks)

You are the night shift Undermanager on duty on Sunday Night. Whilst you are carrying out an inspection on the longwall face, you receive a message that a workman has been struck by a fall of stone roof and currently has his legs caught under a slab of stone 2 metres x 1.2 metres x 300mm. The worker was reported to be roof bolting at the time with a single boom Mobile bolting machine.

You are 2kms away from the incident which happened in the mains development panel.

Describe the actions you would take to ensure the safety of the workmen, the mine and to facilitate further investigation of the incident

Question 8 (20 marks)

You are an Undermanager at a mine where a large section of old workings has just been dewatered and reopened. The workings were driven many years ago and the roadways will need to be re-supported prior to commencing pillar extraction operations. You are given the task of developing and implementing a re-support program.

- a) Describe how you will go about this work (5 marks)
- b) List those matters which will need to be taken into account in developing a suitable support system (5 marks)
- c) Details the matters you will take into account to ensure that the re-support program is carried out safely (5 marks)
- d) Describe the monitoring program you will establish to monitor the effectiveness of your support system during secondary extraction of the old pillars (5 marks)

More information

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Acknowledgments

The Undermanager Examination Panel

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