



## UNDERMANAGER CERTIFICATE OF COMPETENCE | MARCH 2015

# EXAMINATION FOR CERTIFICATE OF COMPETENCE AS AN UNDERMANAGER OF UNDERGROUND COAL MINES

### UB1 Mining legislation paper

Examination date: 18 March 2015

Examination times: 9am – 10am

Examination venue: Hunter TAFE, Kurri Kurri and Wollongong University, Wollongong

Legislation to be assessed: *Work Health & Safety Act 2011, Coal Mine Health & Safety Act 2002, Explosives Act 2003, Coal Industry Act 2001* and their supporting regulations

Instructions to candidates: All five (5) questions are to be attempted. All questions are of equal value - 20 marks each. 10 minutes reading time is allowed prior to the start of the examination.

#### Question 1

##### ***Coal Mine Health & Safety Regulation 2006***

Clause 91 details the 'Maintenance of incombustible content of roadway dust' at an underground coal operation.

List the requirements of this clause.

#### Question 2

##### ***Work Health and Safety Act 2011***

Sections 48 and 49 deal with 'Consultation with Workers' with respect to the 'Nature of consultation' and 'When consultation is required'.

What is contained in these sections?

#### Question 3

##### ***Coal Mine Health & Safety Regulation 2006***

Clause 81 details the 'Installation and operation of conveyor belts' at an underground coal operation.

List the requirements of this clause.

#### Question 4

##### ***Coal Mine Health & Safety Regulation 2006***

Clauses 134, 135, 136 & 137 detail the 'Operation of transport' at a coal operation.

List the requirements of these clauses.



## **Question 5**

### ***Coal Mine Health & Safety Regulation 2006***

Clause 15 details the 'Inspection program' at a coal operation.

What are the requirements of this clause?

**END OF QUESTIONS**

**END OF PAPER**

## UB2 Mine ventilation

Examination date: 18 March 2015

Examination times: 10.30am – 12.30pm

Examination venue: Hunter TAFE, Kurri Kurri and Wollongong University, Wollongong

Legislation to be assessed: *Work Health & Safety Act 2011, Coal Mine Health & Safety Act 2002, Explosives Act 2003, Coal Industry Act 2001* and their supporting regulations

Instructions to candidates: All questions are to be attempted. Question 1 and 2 are of equal value – 100 marks each. 10 minutes reading time is allowed prior to the start of the examination.

### Question 1 – worth a total of 100 marks

Mount Breken Extended Colliery workings are shown on the attached plan.

The colliery works the “Greater Northern” seam, which has a low propensity to spontaneous combustion, is 3.9 metres thick and is overlaid by 4.2 metres of sandstone.

Longwall mining height is the full seam thickness of the “Greater Northern” seam.

The immediate strata below the “Greater Northern” seam consists of a reasonably competent shale bed. There are a number of thin coal seams in the overlying strata.

The Mount Breken Extended Colliery workings are accessed via four short drifts at the foot of an escarpment. The Main mine fan is located on one of the Adits, adjacent to the escarpment.

The “Greater Northern” seam is moderately gassy with a moderate permeability. Total in situ-seam gas content is typically 7 m<sup>3</sup>/t, with a CO<sub>2</sub>:CH<sub>4</sub> ratio of 35:65. Approximately 70% of insitu gas in the cut coal is liberated during the production process.

Typical roof support is a mesh module with 6 x 2.1 metre bolts per metre. Ribs are strong but prone to slab failure. Rib support consists of 1 x 1.2 metre bolt every metre.

The mine produces steaming coal from three Continuous Miners (CM) in development units seven days per week and a longwall panel (LW24) five days per week. The mine produces approximately 3.5 million tonnes per year. Two CM’s are advancing the 504 gate road panel, whilst a single CM is being used to develop the 500 District mains headings.

On the accompanying plan:

- Show the location of all the production faces, together with an estimate of their daily production levels. (15 marks)
- Ventilate the plan using the code of symbols specified in the relevant Australian Standards; Mine Plans – Preparation and Symbols. (30 marks)
- 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. (15 marks)
- Calculate the general body methane and carbon dioxide content in the LW24 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)
- 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). (20 marks)

### END OF QUESTION 1

### Question 2 – worth a total of 100 marks

- Using the data supplied in Question 1 and in relation to the mine layout as per the attached plan:

In conjunction with a review of the Mount Breken Extended Colliery Health and Safety Management System; you are required to organise a Risk Assessment of the ventilation related risks for this mine.

Identify and list the relevant hazards associated with the ventilation related issues which must be addressed by the Health and Safety Management System. Your answer should include Ventilation arrangements and any other identified major hazard management requirements associated with the ventilation. (60 marks)

- b) The Manager of Mining Engineering has given you the task of reviewing and revising the Spontaneous Combustion Management system for the Mount Breken Extended Colliery.

He has suggested that you use 'MDG 1006 Technical Reference for Spontaneous Combustion Management Guideline' as a reference document for this task. In relation to Mount Breken Extended Colliery: (40 Marks)

- i. Discuss how you would carry out this review and revision.
- ii. What spontaneous combustion management hazards have you identified?
- iii. What aspects of the mine design need to be taken into consideration?
- iv. Describe monitoring arrangements for detecting a heating event.
- v. Discuss what measures you would design into the Spontaneous Combustion TARP to deal with a heating event.

**END OF QUESTION 2**

**END OF PAPER**

## UB3 Coal mining practice

Examination date: 18 March 2015  
 Examination times: 1.30pm to 4.30pm  
 Examination venue: Hunter TAFE, Kurri Kurri and  
 Wollongong University, Wollongong

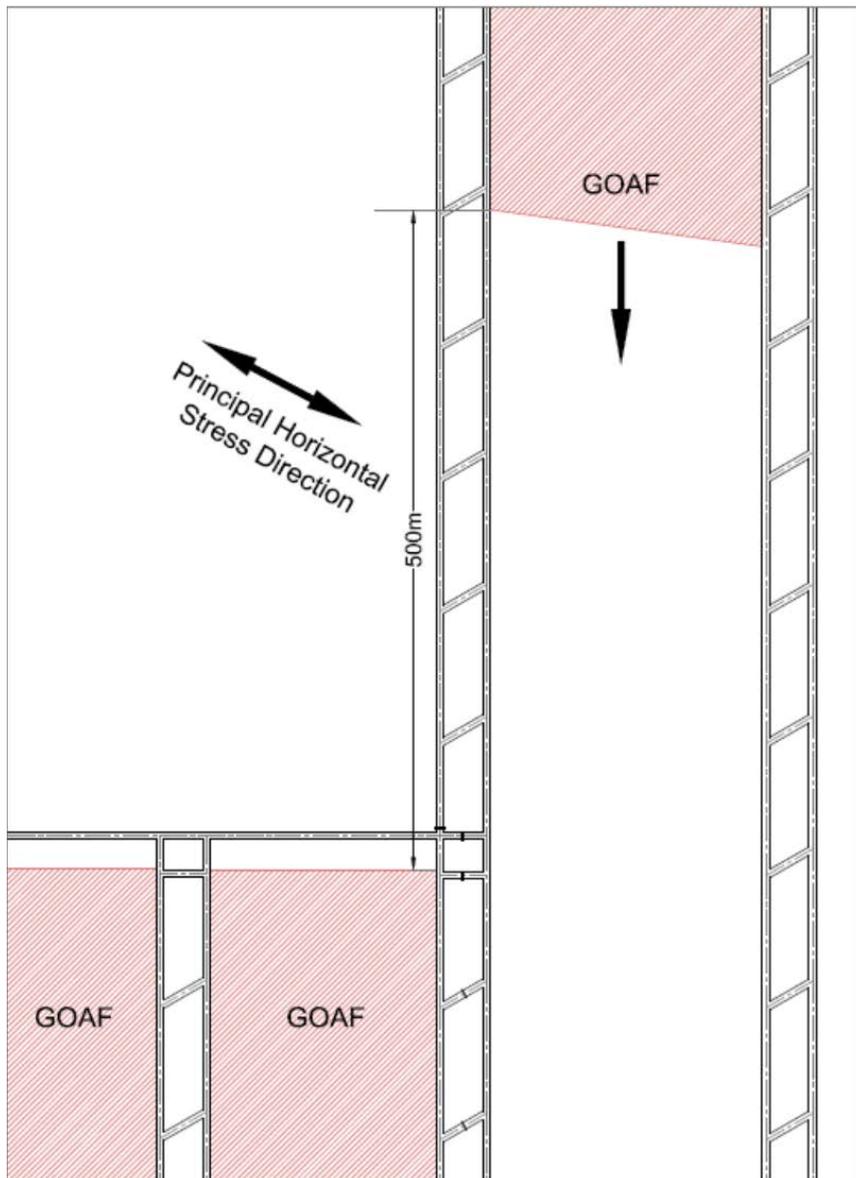
Legislation to be assessed: *Work Health & Safety Act 2011, Coal Mine Health & Safety Act 2002, Explosives Act 2003, Coal Industry Act 2001* and their supporting regulations

Instructions to candidates: Only five (5) of the eight (8) questions are to be attempted. All questions are of equal value - 20 marks each. 10 minutes reading time is allowed prior to the start of the examination.

### Question 1

You are the undermanager of a longwall mine. The current longwall panel is 500 metres longer than the previous panel and will be extracted past the starting position of the previous panel. The layout and principal horizontal stress direction is shown in the following drawing.

The longwall extracts the full seam height of 2.5 metres. The immediate 2 metres of roof is comprised of weak laminated shale which is then overlain by strong sandstones.



- a) What are the likely geotechnical conditions in the tailgate roadway as the longwall face approaches and passes the start line of the previous panel? Detail why such conditions may be experienced. (6 marks)
- b) The mining engineering manager has given you the task of planning and implementing secondary support of the tailgate roadway.  
  
Outline the type of secondary support to be used; including proposed timing of installation. Detail the strata monitoring devices to be implemented and their purpose. (7 marks)
- c) What process and steps would you take to develop and implement safe systems of work for installation of the secondary support? (7 marks)

## Question 2

You are the undermanager of the longwall mine which is about to commence extraction in a new panel. The start position of the longwall panel is overlain by a thick sandstone channel and initial goaf formation is not expected until 40 metres retreat. The mine has moderate methane gas emissions. The longwall face width is 225 metres.

- a) What are the potential hazards up to and during initial caving and goaf formation? (7 marks)
- b) What hazard controls would you ensure were in place to mitigate identified hazards? Use drawings to illustrate controls as required. (8 marks)
- c) You are undermanager on shift and an initial goaf fall in a new extraction panel causes disruption to the mine ventilation control devices. What immediate steps would you take? (5 marks)

## Question 3

You are the undermanager of an underground mine which will soon commence contract development of two drifts of 200 metres length at 1 in 8 grade down to a new target seam. The drifts will predominantly be excavated through strata consisting of thin coal seams, laminated mudstones and siltstones of 20 to 70MPa in strength. Approximately 15% of the drifts will encounter sandstone and conglomerate of up to 130MPa strength.

You have been asked by the mining engineering manager to prepare a plan for the development of the drifts.

- a) What equipment and methods will be required to excavate the drifts? (5 marks)
- b) What hazards are specific to the development of these drifts? (5 marks)
- c) What controls would you put in place to manage these hazards? (5 marks)
- d) Draw a shot firing pattern for full face (5.5 metres wide x 3.0 metres high) excavation through the conglomerate stone. (5 marks)

## Question 4

The mining engineering manager of the mine at which you are employed as an undermanager has instructed you to organize a firm of contractors to develop and construct a series of overcasts underground.

Describe in detail what the Safe Work Method Statement (SWMS) for this job would include (you do not have to describe each sequence, just the content of the SWMS).

The Work Method Statement needs to be compliant with current New South Wales work place safety laws.

## Question 5

You are the undermanager at a mine carrying out longwall extraction. The current longwall is just passing the starting point of the previous longwall. Extra support has been placed in the tailgate in the form of tin cans to support the roadway. You are informed that the tailgate motors are becoming bound by the supports. An inspection of the tailgate indicates that the shearer has progressively been cutting into the roof and leaving coal on the floor. The situation is such that over 600 mm of roof has now been cut into at the tailgate.

After advice from the mining engineering manager, it is decided to shothire the floor. You have not shothired at this mine in the last year.

- a) What are the hazards associated with doing this job? (5 marks)
- b) What controls would you put in place to control these hazards? (8 marks)
- c) What legislative processes are required to carry out this job? (7 marks)

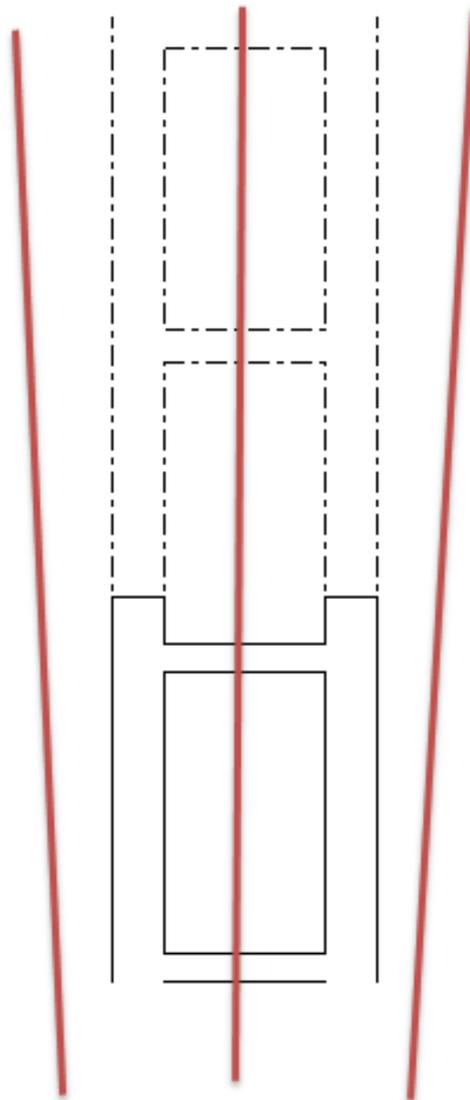
### Question 6

You are the undermanager on afternoon shift and senior person on site when you receive a call from a deputy that a frictional ignition has occurred at the face and there has been a gas explosion. The miner driver and shuttle car driver have been burnt. The crew was driving up to a known fault which had been mined six times previously without incident. The mine is considered to be non-gassy.

- a) Outline the course of action you would take in response to this emergency. (6 marks)
- b) Who would you report this incident to? (2 marks)
- c) List all the hazards you will have to deal with as a result of this incident. (6 marks)
- d) What control measures would you recommend to prevent this incident. (6 marks)

### Question 7

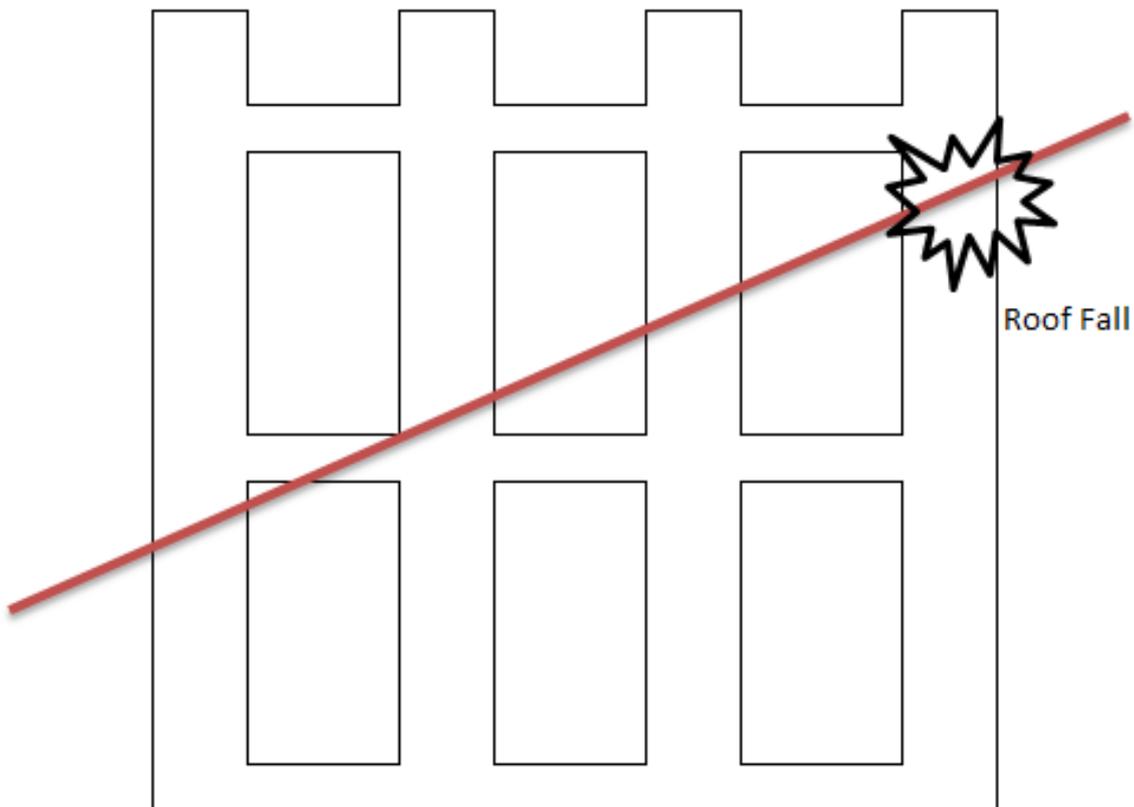
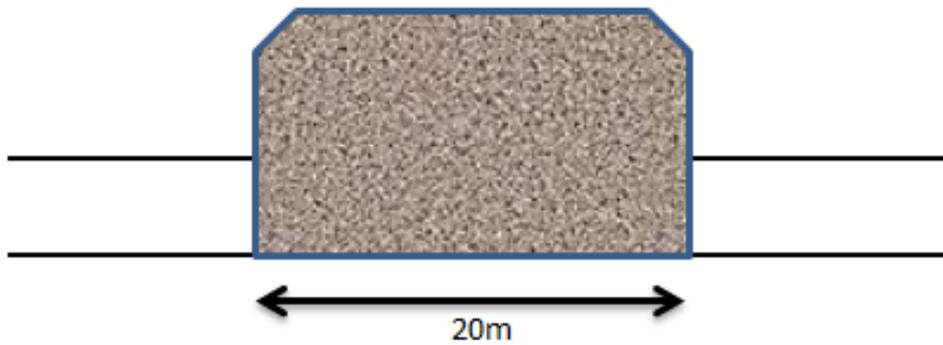
You are the undermanager at a mine with an underground in-seam gas drainage program. One of the gateroads is being driven with flanking gas drainage holes and a single drill hole up the centre of the pillars.



- a) Why are gateroads in "gassy" mines typically subject to drilling? (5 marks)
- b) What parameters are analysed in determining the required drill hole spacing in an in-seam drilling program? (7 marks)
- c) During the first intersection of the centre drill hole by the Continuous Miner, large volumes of gas are released causing a number of gas trips and notifiable events. How can the risk of this event reoccurring in future roadway development be avoided? (8 marks)

**Question 8**

A large fall has occurred in the long term mains travel road of the mine. The fall is 20 metres long and full roadway width (5.2 metres). The cavity has fallen to a height of 8 metres, up to a hard sandstone unit. The area was affected by a large dyke that traversed this section of roadway.



- a) What are the possible options for recovering this roadway? (5 marks)
- b) What are safety hazards and controls that would be present for each option identified in (a)? (5 marks)
- c) The Mining Engineering Manager has requested you to manage the implementation of the Fall Recovery process. Detail how this would occur under the required legislative framework. (10 marks)

**END OF QUESTIONS  
END OF PAPER**

### **More information**

Business Processes & Authorisations

Phone: 02 4931 6625

### **Acknowledgments**

Undermanager Examination Panel

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