

EXAM PAPER | CERTIFICATE OF COMPETENCE

Mining engineering manager of underground coal mines

Summary of written results

Examination Date: 5+6 May 2016

MB1 – Mining Legislation

Question 1 (20 marks)

Clause 72, *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*, refers to Control and Monitoring of Methane Levels. In your own words outline the requirements of this clause.

Question 2 (20 marks)

- a) Clause 128, *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*, outlines the Duty to notify regulator of certain incidents. Outline your understanding of this requirement. (5 marks)
- b) In your own words, list the “high potential incidents” prescribed in this clause. (15 marks)

Question 3 (20 marks)

Schedule 3, *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*, documents “high risk activities”.

- a) Section 10 of the above schedule covers “sealing”. In your own words, describe the requirements of this section. (10 marks)
- b) Section 16 of the above schedule covers “secondary extraction or pillar extraction, splitting or reduction.” In your own words describe the requirements of this section. (10 marks)

Question 4 (20 marks)

- a) The term “mining supervisor” is defined under Clause 3 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*. What do you understand by the term “mining supervisor”? (5 marks)
- b) Clause 10 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* refers to “review of control measures”. In your own words outline the requirements of this clause. (10 marks)
- c) Schedule 10 of the *Work Health and Safety (Mines) Regulation 2014* Clause 4 details the function of the Electrical Engineering Manager for an underground coal mine. In your own words explain the statutory function of this role. (5 marks)

Question 5 (20 marks)

- a) Section 29, *Work Health and Safety (Mines and Petroleum Sites) Act 2013*, outlines the Functions of industry safety and health representatives. In your own words describe the requirements of this section. (10 marks)
- b) Section 30, *Work Health and Safety (Mines and Petroleum Sites) Act 2013* refers to “Suspending

operations”. Describe your understanding of the requirements of this section. (10 marks)

MB2 – Mine Ventilation

Barelia Colliery - Ventilation Plan Description

Barelia Colliery is a modern longwall operation producing 20 000 tonnes per day from 1 longwall face and 2 development units. The mine operates 5 days per week utilising 3 shifts and has a weekend support crew for longwall, outbye and belt system maintenance.

The mine is moderately gassy having a total methane gas content of 4m³/tonne and although no events have occurred, it is deemed to be liable to spontaneous combustion.

The seam is 6 metres thick and 4.8 metres of coal is extracted by the longwall. Development units mine to the 3.2 metre parting. The coal seam is overlain by an undulating sandstone / conglomerate channel unit varying from 5 metres to 20 metres in thickness. The channel varies from 10 metres above the coal seam to within 2 metres in some localised areas.

There are 2 intakes to the mine - 1 drift and a downcast shaft. All air is exhausted from No3 ventilation shaft.

N.B. The bin at pit bottom is an above seam structure fed by an inclined conveyor belt roadway.

Question 1 (100 marks)

From the data supplied and a critical viewing of the plan:

a) Identify and list all relevant critical issues and factors that you believe must be incorporated in, or be addressed by, the ventilation network you will adopt.

Your answer should include but not be limited to issues regarding seam gassiness, seam thickness, goaf gas management and spontaneous combustion. (50 marks)

b) Explain and justify how each of the issues you have identified will be managed in your ventilation network. (50 marks)

Question 2 (100 marks)

a) On the accompanying Barelia Colliery mine plan:

b) Show the locations of all production faces, together with their daily production levels. (20 marks)

c) i) Ventilate the plan using the code of signs specified by Survey and Drafting Directions for Mine Surveyors, addressing issues identified in question 1. (50 marks)

ii) Show the air quantities entering each production panel measured 100m from the last completed line of cut throughs. (10 marks)

d) Show location and type of gas monitoring sensor for each production district and outbye areas of the mine. Indicate methane alarm level limits at each sensor. (10 marks)

e) Show the ventilation quantities entering each surface intake entry to the underground workings and each surface return entry from the underground workings. (10 marks)

MB3 – Coal Mining Practice

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

Four (4) from Section A – Underground (Q1-6) and One (1) from Section B – Open Cut (Q7-8)

Question 1 (20 marks)

You are the Mining Engineering Manager at a mine considering multi seam longwall mining. The intent is to reduce the capital requirements for ongoing operation at the site, as a preference to establishing a new mine in an adjoining lease area.

The target seam is approximately 60 metres below the current seam being worked. The target seam is between 2.6 metres and 3.2 metres thick with an in situ gas content of 11m³/t (90:10 methane to carbon dioxide ratio) with good permeability and similar coal quality properties.

The proposed mine layout for the second seam workings will be on the same footprint as the current workings.

- a) What issues will need to be considered as part of the proposal to mine the new seam directly below the existing mine workings? (10 marks)
- b) Outline the options and strategies you could implement to reduce gas content in the target seam. (*Give advantages and disadvantages for all options*). (10 marks)

Question 2 (20 marks)

You are the Manager of Mining Engineering at an underground mine that has traditionally used place change development machinery for mine development under a competent sandstone roof. However, as the mine has entered a new mining domain, the roof conditions have deteriorated due to laminated siltstone beds now forming the immediate roof. As a result of the deteriorating roof conditions, it has become necessary to move to bolter miners and roof mesh to improve strata security for the life of mine plan.

Explain;

- a) How you would manage this significant transition from normal operations? (10 marks)
- b) Detail the issues to be addressed to ensure the safety of your operation. (10 marks)

Question 3 (20 marks)

You are the Mining Engineering Manager at a longwall operation that has been on care and maintenance for the past 18 months. A small workforce of 8 people perform routine mine maintenance and inspections working in accordance with the approved care and maintenance management plan. All longwall and development equipment is located on the surface.

LW 12 was the last block to be mined and LW 13 is completely formed, including a 7m wide installation roadway and Maingate 14 is currently driven to 4 cut through.

The mine is accessed via a highwall boxcut and nominally pumps 1-2 megalitres of water from the workings per day to a surface water storage facility. In addition, the extensive goaf area of the mine supplies approximately 900 litres/second to a third party gas plant generating electricity for the grid.

Due to improving economic conditions, the Board have approved recommencing mining operations.

As Mining Engineering Manager, detail the approach you would take to safely re-establish full production of 3.5 million ROM tonnes/annum to the site. (20 marks)

Question 4 (20 marks)

Periodic weighting is a potential threat to a longwall operation due to loss of control of strata and the associated safety risks.

- a) Detail your understanding of the factors that contribute to periodic loading. (Diagrams may be used to explain your answer). (10 marks)
- b) Outline the available methods for prediction and prevention of periodic weighting events on longwall faces. (10 marks)

Question 5 (20 marks)

You are the Mining Engineering Manager at a mine that has recently installed a new ventilation shaft and associated dual fan to replace an aging system currently in use. The fan shaft has been completed for 6 months and is known to contain a considerable amount of water. Two roadways each 50 metres in length need to be driven, in seam, to connect the new fan shaft to the underground ventilation network.

Based on the above scenario-

- a) What are the key risks associated with this activity (10 marks)
- b) Based on the risks identified in (a), outline the steps you would initiate to manage each risk? (10 marks)

marks)

Question 6 (20 marks)

You are the Mining Engineering Manager at an underground longwall coal mine and are in attendance at the mine during an afternoon production shift with 60 people currently underground. You have just received a phone call that a large fire has been detected at the main underground 11kv switchroom located at pit bottom. As a result of the fire, all underground power has tripped back to the surface supply.

- a) Outline the actions you would instigate on being informed of the incident. (10 marks)
- b) Identify the criteria you would establish to determine how the fire is to be fought. (5 marks)
- c) Detail the key steps to be taken to return the mine to normal operation post the fire. (5 marks)

Question 7 (20 marks)

You are the Mining Engineering Manager at a small open cut mine. There have been a number of incident reports in relation to mobile equipment movements around the mine. A number of these have had high potential for serious injury or death.

- a) Based on this information what process would you adopt to identify the main areas of risk? (10 marks)
- b) With the main risks identified, what controls would you adapt to prevent a reoccurrence? (10 marks)

Question 8 (20 marks)

- a) Describe, with the aid of sketches where applicable, the process of highwall mining. (10 marks)
- b) Detail the risks associated with this method of mining and how you would control them. (10 marks).

More information

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Acknowledgments

The mining engineering manager examination panel

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