

MINE MANAGER UG COAL | CERTIFICATE OF COMPETENCE

Mining engineering manager of underground coal mines

February 2017

MB1 Mining legislation

- Examinations date:** 5 August 2015
- Examination times:** 12.00pm to 1.00pm
- Examinations venue:** Hunter TAFE, Kurri Kurri Campus
- Instructions to candidates:** All 5 questions are to be attempted. All questions are of equal value at 20 marks each.

Question 1

Section 19 of the *Work Health and Safety Act 2011* – refers to “primary duty of care”. Subsection (3) prescribes the matters that “the person conducting a business or undertaking must ensure, so far as is reasonably practicable”. In your own words discuss these prescribed matters in subsection (3)? (20 marks)

Question 2

- a) The NSW Explosives Act 2003 No 39 and Regulation 2013 require certain licences to be maintained at a mine site in order for the mine to use explosives. List the licences required to be held in order for the mine to utilise explosives. (5 marks)
- b) In your own words list the requirements to obtain a blasting explosives user’s licence for an underground coal mine. (15 marks)

Question 3

You are the Mining Engineering Manager of an underground coal mine. Due to geotechnical issues a decision has been made to shorten the longwall development panel by 500m, thus shortening the length of the longwall block being developed. Currently the two (2) heading gate road development panel is in position to commence drivage of the new installation face at the new location. It is proposed to drive the installation face without a bleeder.

Details of the proposed drivages and related information is as follows:

Installation face width – 395 metres

Installation face road width – 8.5 metres

Shearer stable width – 9.5 metres

BSL installation roadway width required – 6.5 metres

- a) Clause 33 of the *Work Health and Safety (Mines) Regulation* prescribes the requirements for the “notification of high risk activities”. List the high risk activity(s) that will need to be notified to the inspectorate in this instance. (15 marks)
- b) In your own words describe the requirements that must be covered as part of any high risk activity notification. (5 marks)

Question 4

- a) The term “mining supervisor” is defined under clause 3 of the *Work Health and Safety (Mines) Regulation 2014*. What do you understand by the term “mining supervisor”? (5 marks)
- b) Clause 135 of the *Work Health and Safety (Mines) Regulation 2014* lists seven (7) “key statutory functions” required at a mine. List the “key statutory functions” required for an underground coal mine. (5 marks)
- c) Schedule 10 of the *Work Health and Safety (Mines) Regulation 2014* Clause 3 details the function of the Mining Engineering Manager for an underground coal mine. In your own words explain the statutory function of this role. (10 Marks)

Question 5

- a) Clause 88 of the *Work Health and Safety (Mines) Regulation 2014* require for the mine operator to “prepare an emergency management plan”. Subclause (2) (a) lists seven (7) aspects of emergency response that must be addressed. In your own words list at least five (5) of these aspects. (10 marks)
- b) Clause 96 of the *Work Health and Safety (Mines) Regulation 2014* prescribes the requirements a mine operator must comply with in relation to “emergency exits”. Subclause (1) to (3) details the minimum requirements for exits from an underground mine. In your own words detail these requirements? (10 marks)

MB2 Mining Ventilation

Examinations date: 5 August 2015

Examination times: 2.00pm to 5.00pm

Examinations venue: Hunter TAFE, Kurri Kurri Campus

Instructions to candidates: Both questions are to be attempted. All questions are of equal value at 100 marks each. Answers are to be written in the answer booklet and on the ventilation plan as applicable.

Rebecca Colliery - Ventilation Plan Description (1:10000, AO size)

Rebecca Colliery workings are shown on the attached plan.

The colliery started life as a bord and pillar operation before investing in longwall extraction. Longwall 22 is currently being extracted with Longwall 23 being developed. Future development of the mine is dependent on advancing District 500 to access a new lease area for further longwall development. It has been identified that due to discontinuity between longwall 23 and the new lease area development has commenced in District 600 to form additional longwall blocks adjacent to longwall 9.

In total the colliery produces thermal coal from three development units and a longwall panel 7 days per week. The colliery has a ROM budget of 3.0 million tonnes annually.

The colliery works the Leisa seam which has a high propensity to spontaneous combustion. The seam is split into upper and lower sections by a thin claystone band. The target seam is the 3m thick lower Leisa seam. The Leisa seam coal has a specific gravity of 1.40t/m³.

The Karen seam sits below the Leisa seam and is separated by a 1m thick bed of shale.

The Leisa and Karen seams are very gassy with a moderate to low permeability. Total in situ seam gas content is typically 14 and 16m³/t respectively with a CO₂:CH₄ ratio of 80:20. The workings are accessed

via three decline drifts with the ventilation system returning via one concrete lined 5.5 metre diameter upcast ventilation shaft 80 metres long.

Coal strength ranges from 14 to 20 MPa. Typical roof support is 6 x 2.1m bolts and a 1m x 5.2m mesh module per metre.

Question 1 (Worth a total of 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, spontaneous combustion and the impact on ventilation management of multiple surface intakes and outlets. (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 (Worth a total of 100 marks)

On the accompanying Rebecca Colliery mine plan:

- a) Show the locations of all production faces, together with their daily production levels. (15 marks)
- b) Ventilate the plan using the code of signs specified by Survey and Drafting Directions for Mine Surveyors, addressing issues identified in question 1. (25 marks)
- c) i) Show the air quantities entering each production panel measured 100m from the last completed line of cut throughs. (15 marks)
- ii) Calculate the general body methane and carbon dioxide content in each panel return (clearly state assumptions you are relying upon in these calculations). (15 marks)
- iii) Will gas drainage be required and if so, what quantity of both methane and carbon dioxide will need to be captured? (15 marks)
- d) Show the ventilation quantities entering each surface intake entry to the underground workings and each surface return entry from the underground workings. (15 marks)

MB3 Coal Mining Practice

Examinations date: 6 August 2015

Examination times: 9.00am to 12.00pm

Examinations venue: Hunter TAFE, Kurri Kurri Campus

Instructions to candidates: Five (5) questions only are to be attempted for this paper. This paper is in two sections A and B. Four (4) questions must be attempted from section A (questions 1-6) and One (1) question only is to be attempted from section B (questions 7-8) All questions are of equal value at 20 marks each.

Section A - Underground

Question 1

Multi seam mining is becoming more practiced as older mines look to continue operation at a time when the capital requirements to start a new mine are prohibitive. This is the case at the underground coal mine where you are the Mining Engineering Manager.

The target seam is approximately 80 metres below the current seam being worked. The target seam is between 3.2 metres and 3.8 metres thick with an in situ gas content of $14\text{m}^3/\text{t}$ (90:10 methane to carbon dioxide ratio) with good permeability.

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

- 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)
- 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

- The R70 test is a common method of determining the spontaneous combustion potential for coal. Briefly describe how the R70 test is performed and what information it provides.(5 marks)
- What is your understanding of the term self-heating temperature (SHT), also known as thermal runaway? (5 marks)
- What are typical indicators of the onset of a heating in coal? Outline the advantages and disadvantages of these indicators. (5 marks)
- What ratios are typically used to determine the extent of a heating? Outline the advantages and disadvantages of these ratios. (5 marks)

Question 3

You are the Mining Engineering Manager at a longwall operation. In the gate road development panel progress has been halted due to high gas concentrations. As a result, the panel is now being shortened by approximately 500 metres.

A series of surface to in-seam (SIS) gas drainage holes of 200mm diameter were used to pre-drain the area to be developed. The SIS holes are flanking either side of the gate road headings. The change in mine plan will require the intersection of the SIS boreholes. Currently the SIS boreholes are active with flow rates of between 1000 l/s and 1500 l/s.

Detail the approach you would take as Mining Engineering Manager to allow mining through the SIS boreholes. (20 marks)

Question 4

Periodic weighting is a potential threat to a longwall operation due to loss of control of strata.

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

Question 5

Respirable dust and quartz is a hazard that must be managed at all underground coal mines. As Mining Engineering Manager the following gravimetric airborne dust sampling report is presented to you for the longwall panel.

Occupation	Respirator	Beard	Result (mg/m^3)	Alpha-Quartz (mg/m^3)
Shearer Operator	3M disposable	Yes	3.54	0.10
Chockman	Full Face	Yes	3.88	0.11

M/G Operator	Full Face	No	2.45	0.09
Deputy	Full Face	No	6.62	0.18

- What are the specified limits for respirable dust and respirable quartz? (4 marks)
- Based on the data from the table above, what are the possible causes for the results? (8 marks)
- What actions would you instigate based on the data provided in the table? (8 marks)

Question 6

You are the Mining Engineering Manager at an underground coal mine. You have just received a phone call that a fire has been detected on the incline drift main trunk conveyor out of the mine.

- Outline the actions you would instigate on being informed of the fire. (10 marks)
- Identify the criteria you would establish to determine how the fire is to be fought. (5 marks)
- Detail the equipment associated with the particular technique(s) you have adopted to fight the fire. (5 marks)

Section B - Open Cut

Question 7

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.

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

Question 8

You are the Mining Engineering Manager at a small open cut coal mine. The mine has identified remnant coal off the highwall that can be recovered to supplement production. Strip ratios in the area make conventional mining methods unviable.

- List the methods available to recover coal from the identified area. (10 marks)
- For one of the methods identified, detail the risks associated with this method of mining and how you would control them. (10 marks)

More information

Business Processes & Authorisations

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Acknowledgments

Mining engineering manager examination panel

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