



UNDERMANAGER CERTIFICATE OF COMPETENCE | SEPTEMBER 2014

Examination for Certificate of Competence as an undermanager of a mine

UB1 Mining legislation paper

Examination date: 19 September 2014

Examination times: 9am – 10am

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

Instructions to candidates: All five (5) questions are to be attempted. All questions are of equal value - 20 marks each.

Question 1

Section 28 of the *Coal Mines Health & Safety Act 2002* requires the operator to review the health and safety management system. When is this review required?

Question 2

Section 19 of the *Work Health and Safety Act 2011* sets out the PCBU's primary duty of care requirements. What are these requirements?

Question 3

Clauses 44, 45 and 46 of the *Work Health and Safety Regulations 2011* outlines the use of personal protective equipment. What is contained in these clauses?

Question 4

Notification of certain incidents at or in relation to coal operations

List the requirements under the following Act and Regulation:

- *Coal Mines Health and Safety Act 2002*, Section 110 (1) (b)
- *Coal Mines Health and Safety Regulation 2006*, Clause 55

Question 5

List the requirements of Clause 18 of the *Coal Mines Health and Safety Regulation 2006*, Monitoring arrangements.

END OF QUESTIONS

END OF PAPER



UB2 mine ventilation

Examination date: 19 September 2014
Examination times: 10.30am – 12.30pm
Examination venue: Hunter TAFE, Kurri Kurri and
Wollongong University, Wollongong

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

Egan Colliery workings are shown on the attached plan.

The colliery works the “Western Bain” seam, which has a low to medium propensity to spontaneous combustion, is 3.2 metres thick and is overlaid by 6 metres of mudstone. Mining height is the full seam thickness of the “Western Bain” seam. The immediate strata below the “Western Bain” seam consists of a thick, competent bed of sandstone. There are a number of thin coal seams in the overlying strata.

The Egan Colliery workings are accessed via four short portal drivages (Adits) at the base of a highwall in a discontinued open cut coal mine. The main mine fan is located on one of the Adits, adjacent to the highwall.

The “Western Bain” seam is moderately gassy with a moderate permeability. Total in-situ seam gas content is typically 8 m³/t, with a CO₂:CH₄ ratio of 20:80. Approximately 60% of in-situ 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, requiring rib support of 1 x 1.2 metre point anchor bolt every metre.

The mine produces steaming coal from three continuous miners (CMs) in development units seven days per week and a longwall panel (LW100 West) five days per week. The mine produces approximately 3.6 million tonnes per year. Two CMs are advancing the tail gate headings, while a single CM is being used to develop a main gate road for the new longwall panel LW1001.

On the accompanying plan:

- a) Show the location of all the production faces, together with an estimate of their daily production levels (15 marks).
- b) Ventilate the plan using the code of symbols specified in the relevant Australian Standard; mine plans – preparation and symbols (30 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 (15 marks)
- d) Calculate the general body methane and carbon dioxide content in the LW900W 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) (20 marks).

END OF QUESTION 1

Question 2 – worth a total of 100 marks

- a) 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 Egan Colliery health and safety management system, you are required to organise a risk assessment of the ventilation related risks for this mine.

Briefly describe the process of how you will go about this project. Identify and list the relevant hazards associated with 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 (80 marks).

- b) Graham's ratio (GR) was derived as a measure of the intensity of the oxidisation of coal. (20 marks)
- i. Using the following data from your gas monitoring, determine the GR of the following sample (5 marks).
- | | |
|-----------------|---------|
| Oxygen | 19.8 % |
| Nitrogen | 78.90 % |
| Carbon monoxide | 185 ppm |
| Methane | 1.2% |
- ii. What does your answer in b) i. tell you about what is happening? (2 marks)
- iii. What are the generally accepted GR levels and what does each level indicate? (3 marks)
- iv. Explain the mechanism of spontaneous combustion of coal in coal mines (10 marks).

END OF QUESTION 2

END OF PAPER

UB3 coal mining practice

Examination date: 19 September 2014

Examination times: 1.30pm to 4.30pm

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

Instructions to candidates: Only five (5) of the eight (8) questions are to be attempted. All questions are of equal value - 20 marks each.

Question 1

You are the undermanager at an underground mine which has a recent history of excess cable damage. The manager asks you to prepare a cable management plan to help reduce the health and safety risks and the costs.

- a) What should this plan contain? (6 marks)
- b) How would you implement this plan? (8 marks)
- c) How would you ensure that the plan is working? (6 marks)

Question 2

You are the undermanager at a mine that has struck a dyke which is running across the longwall block at a 30 degree angle. The dyke has become too hard to cut with the shearer. The dyke is approximately 3 metres thick. It is anticipated the rest of the dyke will need blasting.

- a) What legal requirements are needed to be completed before blasting can commence on the face? (15 marks)
- b) What would you do to quicken up production rather than blasting every lift on the face? (5 marks)

Question 3

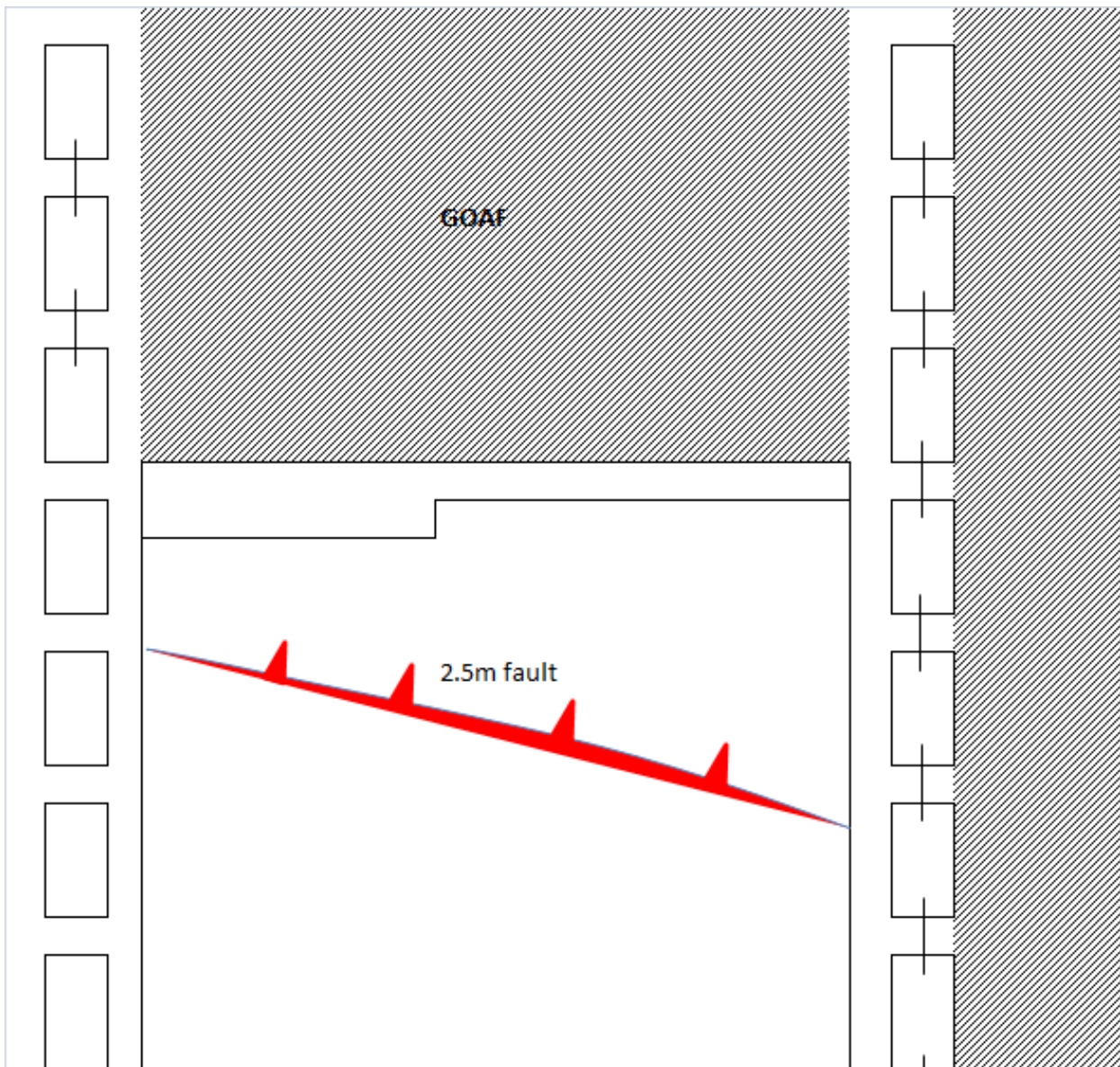
You are the undermanager at a pillar extraction mine. The deputy rings you and asks for a minor variation to the pillar extraction sequence.

- What is the definition of a minor variation? (6 marks)
- What are you required to do in order to give a variation? (7 marks)
- After you decide the variation is warranted, what are you required to do? (7 marks)

Question 4

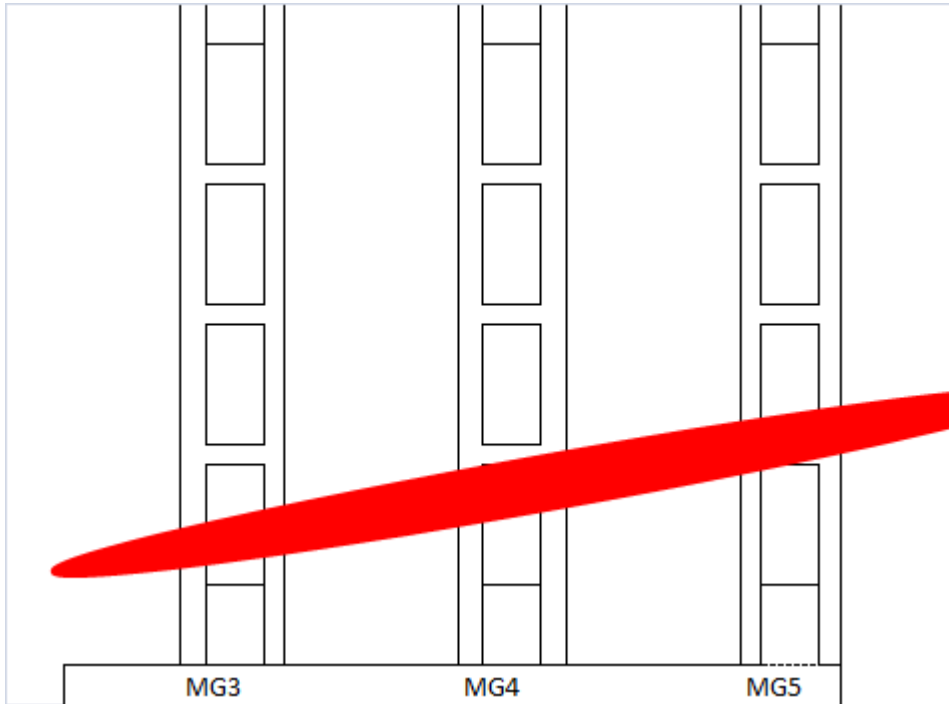
You are an undermanager at a longwall mine. The mine manager has given you the task of developing a process for the longwall to extract through an upcoming 2.5m fault. The seam thickness is 3.4m and has a high propensity to spontaneous combustion. The roof is heavily banded sandstone.

In your answer, describe the process you would use to develop appropriate systems of work and the appropriate controls that you would put in place.



Question 5

You are the undermanager of a mine that has experienced significant issues (up to 1-2m) with floor heave in development operations in MG3. It is expected that the floor heave is associated with a zone which will continue till at least MG4 and MG5. The mine is 300m deep at this point and the immediate floor is normally mudstone.

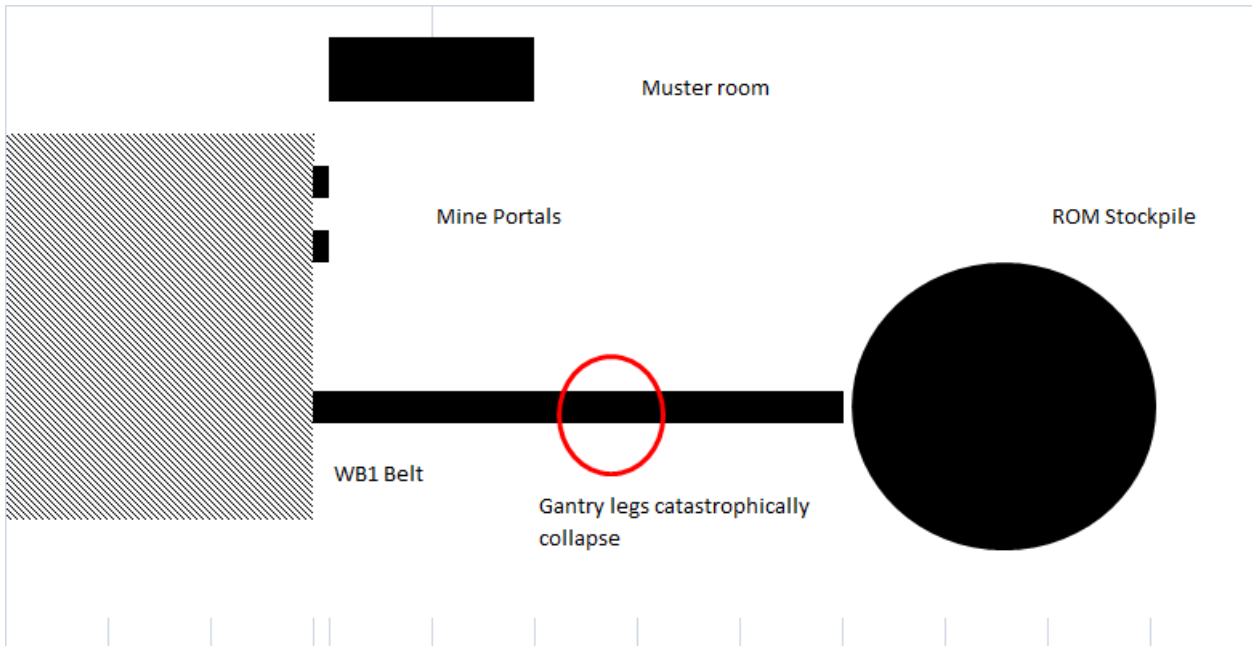


- What causes floor heave? (5 marks)
- What are the hazards associated with floor heave? (5 Marks)
- The mine manager has given you the task of coming up with a plan to minimise the impacts of floor heave on mining safety in MG4 and MG5. Outline your plan as to how you would achieve this. (10 Marks)

Question 6

You are the undermanager of a highly productive longwall mine which contains a surface belt (WB1) that links the underground workings to the ROM stockpile.

During your shift, gantry legs of the structure catastrophically collapse causing significant structural damage to the WB1 belt.



- What are your initial actions when you receive this report? (10 marks)
- What controls could have been in place to mitigate the possibility of this event having occurred (10 marks).

Question 7

- What is the purpose of "goaf drainage" and how does it work? (4 marks)
- Draw a typical vertical goaf drainage well layout for a 2000m long / 300m wide longwall block. (10 marks)
- How are vertical goaf drainage wells completed to ensure their effectiveness in weak strata above the longwall block? (6 marks).

Question 8

You are an undermanager in charge of reopening old main workings and the set-up of a development panel. The old workings were flooded by water two years ago. The area has been inspected to the water's edge on a weekly basis since the flooding.

- The flooded area consists of a 5 heading arrangement (all roadways 5m wide x 3m high) and the pillar dimensions are 50m x 30m.
- The face cut-through and the first cut-through behind the face of the panel are flooded and the average depth of water is 2m over the area.
- The water's edge extends back to 85m from the inbye face.

Using the information above answer the following:

- Calculate the total volume of water to be pumped out. (5 marks)
- Select and describe the pumping system you would set up given the main mine sump is located 1.5km away and there is 10m rise in vertical head. (5 marks)
- List the issues that you must consider as the water is being pumped out of the area. (5 marks)
- Describe what things need to be done once the water is removed and prior to the panel being ready for production. (5 marks)

**END OF QUESTIONS
END OF PAPER**

More information

Business Processes & Authorisations

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Acknowledgments

Undermanager Examination Panel

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