

CANDIDATE EXAM PAPER

CANDIDATE NUMBER: _____

UB1 – Legislation Paper

**UNDERMANAGER OF UNDERGROUND COAL MINES
EXAMINATION FOR CERTIFICATE OF COMPETENCE**

*Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2022*

Legislation to be assessed:

Unless otherwise stated all references to Act and Regulations are to:

Work Health and Safety Act 2011

Work Health and Safety Regulation 2017

Work Health and Safety (Mines and Petroleum Sites) Act 2013

Work Health and Safety (Mines and Petroleum Sites) Regulation 2022

Explosives Act 2003

Explosives Regulation 2013

This Examination is held in the following location:

Region: New South Wales

Venue: Tocal College

Room: The Hall

Start date/time: 29 Mar 2023 10:50:00

UB1 – Legislation Paper

INSTRUCTIONS TO CANDIDATES

UB1 – Legislation Paper | Mar-2023

Q #	Marks	Available Marks	Marked by <i>Initials</i>	Summary comments to justify
1		20		
2		20		
3		20		
4		20		
5		20		
Paper Total		100		<i>Marks checked by:</i>

EXAM BOOKLET

Answers are to be written in the allocated spaces
within this booklet ONLY

Answers must be written in pen however,
drawings may be completed in pencil

This booklet is not to be altered in any way,
pages are not to be added or removed

Additional space is provided at the end of the paper.

Please label which question the answer relates to.

Question 1

Question 1 (total 20 marks) (Essential question)

Work Health and Safety Act 2011 [NSW], Section 19 details Primary duty of care

The following questions are in relation to Section 19:

- a. Complete the missing words or numbers from Section 19 (2): **(4 marks)**

A person conducting a business or undertaking must ensure, _____,
that the health and safety of other persons is not put at _____ from _____
carried out as part of the conduct of the business or undertaking.

- b. Complete the following missing words and state the 7 points to Section 19 (3):

(16 marks)

(3) Without limiting subsections (1) and (2), a person conducting a business or undertaking must ensure, _____ ;

a)

b)

c)

d)

e)

f)

g)

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Question 2

Question 2 (total 20 marks) (Essential question)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 [NSW], Section 46 details Operation of belt conveyors, complete the missing words.

Question 2 (a) (10 marks)

(2) In managing risks to health and safety associated with the operation of belt conveyors at the mine, the mine operator must do the following;

a)

b)

c)

d) For an underground coal mine — ensure each belt conveyor in operation is inspected by a competent person;

i)

ii)

Question 2 (b) (10marks)

Two hours prior to the end of your shift as the shift undermanager, an incident occurred where an Outbye Deputy investigates a low-level CO Alarm on the main trunk belt system. On inspection the Deputy finds a pile of smouldering coal on the ground around a roller on the belt.

Complete the detail from the relevant legislative sections below that are a requirement for this event:

WHS (MPS) Reg 2022 s190 -

WHS (MPS) Act 2013 S15 -

WHS (MPS) Act 2013 S16 -

WHS (MPS) Act 2013 S17 -

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Question 3

Question 3 (total 20 marks)

a) Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 [NSW], Section 60 details Requirements if air quality and air safety standards not met.

Complete the following missing words and state the 4 points to Section 60 (5):

The mine operator of an underground mine satisfies the requirements of subsection (4) if the mine operator ensures _____ are in place at the mine to require;

a) The person with responsibility for an area of the mine to be informed as soon as reasonably practicable after a person finds the ventilation is _____ in the area, and

b) the person with responsibility for the affected area to do the following;

i)

ii)

iii)

iv)

b) Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 [NSW], Section 62 details Ventilation systems.

Complete the following missing words.

(1) The mine operator of an underground mine must ensure air supplied to the ventilation system at the mine is obtained from the purest source available.

(2) The mine operator must ensure the following -

(a) ventilation circuits at the mine do not allow _____ of air,

(b) plant and _____ that regulate airflow are _____ in good working order,

- (c) _____ headings are not _____ unless -
- (i) the purpose of entry is to _____, and
- (ii) _____ is provided to the person entering the heading,
- (d) an _____ or scrubber fan used at the mine is located and _____ in a way that prevents uncontrolled recirculation of air through the fan,
- (e) a ventilation fan _____ at the _____ for the purpose of ventilating the underground mine is placed in a position and under conditions that ensure the least amount of damage as possible is caused to the fan in the event of an explosion, or other overpressure event, at the underground mine,
- (f) a _____ is in place for _____ each type of fan, including the main fan,
- (g) no person deals with a main fan or auxiliary fan ventilating an underground mine unless the person is _____ by the _____ to do so,
- (h) no person _____ a fan ventilating an underground mine unless each person likely to be adversely affected by the starting or stopping has been notified.

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Question 4

Question 4 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 [NSW] Part 3 states the requirements for managing risks. Detail the specific requirements of the following sections:

Section 15 Review of control measures – What circumstances could cause for a review of control measures? (8 marks)

Section 15 Review of control measures – Who may request the review of a control measure under this section? (2 marks)

Section 16 Record of certain reviews of control measures – What must the Operator of a mine keep a record of when completing a review of a control measures? (10 marks)

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Question 5

Question 5 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 prescribe functions of certain roles. State the Statutory function of the following positions in an underground coal mine:

Deputy (1 mark)

Undermanager (3 marks)

In relation to the following roles, what are the eligibility criteria required to be appointed in the following roles:

Industry safety and health representative (2 marks)

Site safety and health representative (2 marks)

Electrical safety and health representative (2 marks)

Work Health and Safety Act 2011 Section 68 states the powers and functions of health and safety representatives, list these in relation to a workgroup at a mine site (8 marks)

Work Health and Safety Act 2011 Section 64 states the term of office of health and safety representatives, what is the length of term. (2 marks)

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CANDIDATE EXAM PAPER

CANDIDATE NUMBER: _____

UB2 – Mine ventilation Paper

**UNDERMANAGER OF UNDERGROUND COAL MINES
EXAMINATION FOR CERTIFICATE OF COMPETENCE**

*Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2022*

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Work Health and Safety (Mines and Petroleum Sites) Regulation 2022

Explosives Act 2003

Explosives Regulation 2013

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Region: New South Wales

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Start date/time: 29 Mar 2023 12:50:00

UB2 – Mine ventilation Paper

INSTRUCTIONS TO CANDIDATES

UB2 – Mine ventilation Paper | Mar-2023

Q #	Marks	Available Marks	Marked by <i>Initials</i>	Summary comments to justify
1		100		
2		70		
3		30		
Paper Total		200		<i>Marks checked by:</i>

EXAM BOOKLET

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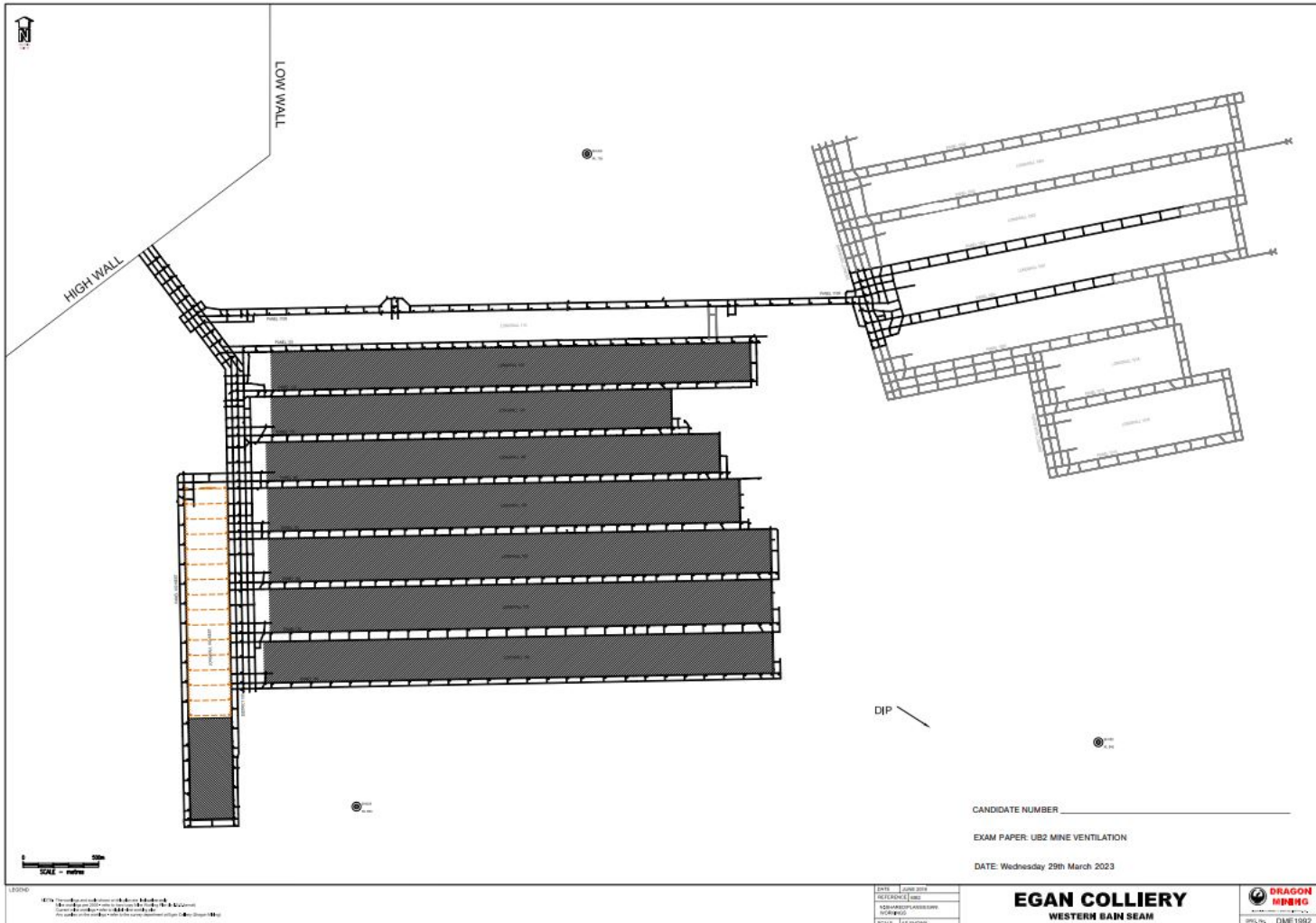
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Question 1



Egan Colliery workings commence at the toe of the highwall from the discontinued Egan Opencut mine. Workings are shown on the attached plan.

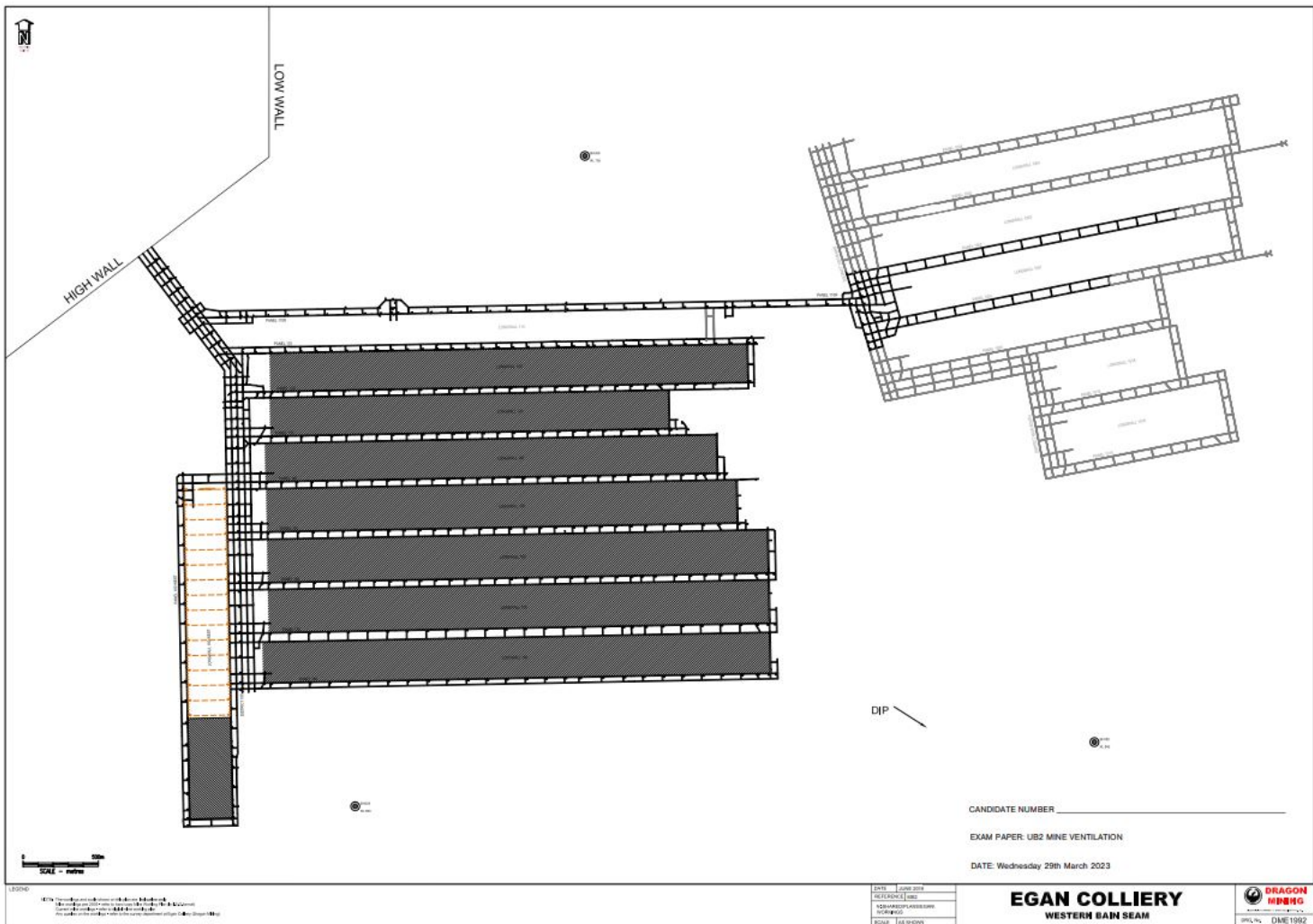
The colliery works the “Western Bain” seam, which is 9 metres thick in total and has a medium propensity to spontaneous combustion. The seam is overlaid by 8 metres of quartz bearing sandstone and mudstone. The working section is the bottom 3 metres of the Western Bain seam.

The immediate strata below the “Western Bain” seam, is a 1.0 metre thick reasonably competent bed of shale.

The Egan Colliery workings are accessed via 4 short portal drivages at the base of a highwall in a discontinued open cut coal mine. One of these portal drivages is connected to the Main Ventilation Fans.

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Question 2



Question 2 (total 70 marks)

The following are short answer questions on a range of matters which should be answered in dot point format

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

Identify and list the relevant hazards associated with the ventilation arrangements and those issues which must be addressed by the ventilation control plan. Your answer should include ventilation control measures and any other identified major hazard management requirements associated with the ventilation. (70 marks)

	/70
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Question 3

Recirculation: **(Essential Question)**

You are an Undermanager on surface, when a development deputy contacts you to inform you that recirculation is occurring in their respective panel. In short answer format, answer the following:

- a. How recirculation can occur in a 2-heading development panel using an auxiliary fan with an open circuit capacity of 21m³/s (5 marks)

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- b. Treatment options for recirculation in a development panel (5 marks)

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d. What actions the Undermanager should take (10 marks)

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CANDIDATE EXAM PAPER

CANDIDATE NUMBER: _____

UB3 – Coal mining practice Paper

**UNDERMANAGER OF UNDERGROUND COAL MINES
EXAMINATION FOR CERTIFICATE OF COMPETENCE**

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Work Health and Safety (Mines and Petroleum Sites) Regulation 2022*

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Explosives Regulation 2013

This Examination is held in the following location:

Region: New South Wales

Venue: Tocal College

Room: The Hall

Start date/time: 30 Mar 2023 09:50:00

UB3 – Coal mining practice Paper

INSTRUCTIONS TO CANDIDATES

UB3 – Coal mining practice Paper | Mar-2023

Q #	Marks	Available Marks	Marked by <i>Initials</i>	Summary comments to justify
1		20		
2		20		
3		20		
4		20		
5		20		
6		20		
7		20		
8		20		
Paper Total		160		<i>Marks checked by:</i>

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Question 1

Question 1 (total 20 marks)

You are an Undermanager at an underground coal mine that has moderate to high insitu gas content with a predominant composition of methane. In-seam drilling interpretation has inferred a 2.5m thick Dyke ahead of the two-heading gate road drivage. A recent core result indicates the dykes hardness is over 200MPa.

The decision has been made to utilise explosives for the first time at this mine to develop through the dykes. You have been asked by the Mine Manager to coordinate a project to shot fire this dyke.

- a. What are your immediate concerns? (4 marks)

- b. What are the documents and licenses related to the storage, handling, transport and use of explosives that you will need as part of this project? (6 marks)

c. What are some of the key controls that you would ensure are in place prior to shot firing? (6 marks)

d. What equipment would you provide to the shotfirers to safely complete the shot firing operations in the panel? (4 marks)

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Question 2

Question 2 (total 20 marks)

You are the night shift Undermanager. The mine extracts all coal from a 3m thick seam in 300m wide longwall blocks using Uni-Di cutting sequence. The immediate roof consists of 4 to 6m of shale / mudstone overlain by 20m thick sandstone unit. The roof has been deteriorating in some areas across the face over the past 24 hours, though has been reported as being managed by double chocking the shields.

While conducting your underground inspections in a development panel, you receive a phone call from the longwall deputy that a roof fall has occurred. The roof has fallen in up to 2m high with some areas up to 4m high. Tip to face is over 2m in some areas. The poor roof area is located from shield 80 to 140. The Shearer is on the tailgate side of the roof fall. (6 marks)

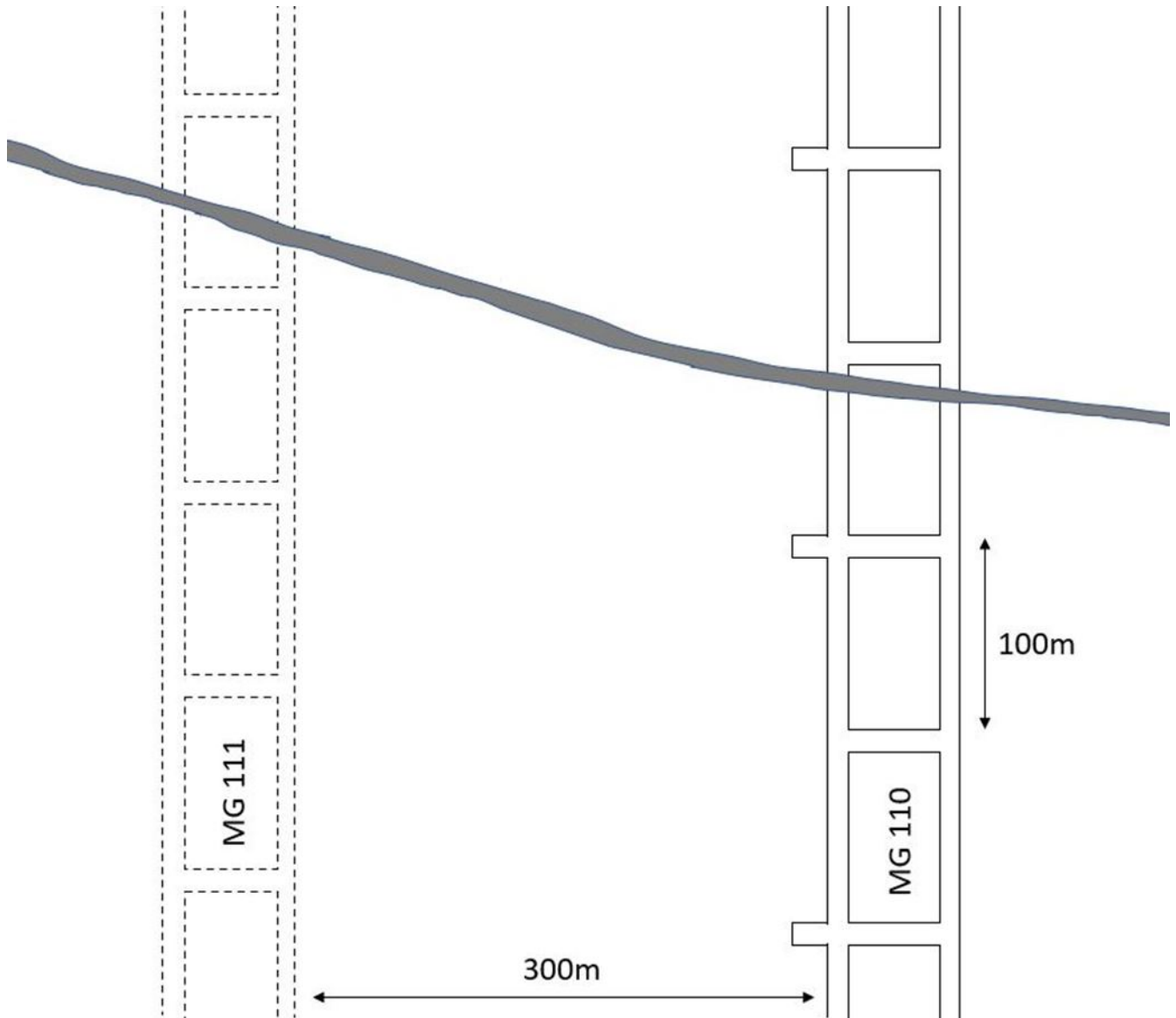
A. Describe the actions and immediate directions the Undermanager should complete. (8 marks)

B. The Mine Manager has assigned the Undermanager the task to scope up a recovery plan. Describe the way in which the Undermanager should plan a recovery and the control measures that should be put in place to manage health and safety of Workers. (8 marks)

C. Outline the benefits and restrictions when using polymeric chemical products and phenolic foam for strata consolidation (4 marks)

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Question 3



Question 3 (total 20 marks)

You are an Undermanager at a mine and the Mine Manager has requested you plan out an effective in seam gas drainage program to ensure mining can be completed below threshold limits. MG111 panel is due to be mined in 12 months' time, regional gas content is 14m³/t at 80% CH₄ with high permeability. It has been noted from previous gate roads that the 5m thick dyke has low permeability either side in close proximity to the structure.

A. Draw a pre-drainage in-seam drilling pattern to cover MG111 panel and the Longwall block inbetween these gate road panels from the drill stubs in MG110 panel. Show holes that would be re-entered to obtain future cores. (5 marks)

B. What parameters are analysed in determining the required drill holes in an in-seam drilling program? (5 marks)

C. Explain any considerations when drilling around significant geological structures (5 marks)

D. Explain how a gas core is taken underground at the drill site and how the total gas content is calculated once the core has been taken (5 marks)

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Question 4

Question 4 (total 20 marks)

You are the night shift undermanager at an underground coal mine that is moderately gassy and has a moderate to high propensity for spontaneous combustion.

- a. Explain the process of spontaneous combustion in an active longwall goaf and what factors could increase the likelihood of oxygen ingress into this goaf? (8 marks)

b. Explain the R70 index and how it is derived. (4 marks)

- c. Draw and explain the Coward Triangle and what happens when air/oxygen, fuel or inerts are added to the goaf mixture. (8 marks)

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Question 5

Question 5 (total 20 marks)

The following are short answer questions on a range of matters which should be answered in dot point format:

a. What is a frictional ignition? (4 marks)

b. List 5 factors that contribute to frictional ignitions. (5 marks)

c. List and briefly describe five (5) controls measures which should be implemented to prevent frictional ignitions? (5 marks)

d. Upon receiving this information what actions should be taken by the undermanager to comply with legislation? List and briefly describe 4 actions. (8 marks)

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Question 7

Question 7 (total 20 marks)

The following are short answer questions on a range of matters which should be answered in dot point format:

You are the Weekend night shift Undermanager at mine that operates 3 development units and a longwall panel. Access to the mine is via a box cut with a transport drift and a belt drift as the second egress. During your shift on Saturday night, you receive a PED message to contact control. The Control Room Operator notifies you of the following;

An operator was driving a man transporter down the ramp of the mine to the portal entrance, following a vehicle into the portal. When the vehicle in front stopped at the portal entrance for the operator to activate the block lights the man transporter driver following was surprised and he applied the brake very hard. This caused the man transporter to skid to the right where it ran up a slight ramp and rolled onto its side. No one was injured in the incident. The Outbye Deputy attended the site and organised for clean-up of the site and righted the man transporter and had it taken to the workshop for any repairs.

a. What were the potential causes of this incident? (5 marks)

b. What actions should the Undermanager take immediately, and in the future? (15 marks)

Question 8

Question 8 (total 20 marks)

The following are short answer questions on a range of matters which should be answered in dot point format:

You are the Undermanager at a mine that works a 6.5m thick coal seam. The Longwall extracts 4.0m coal leaving nominally 2.5m in the roof. The coal seam is gassy and the mine has a history of spontaneous combustion. The seam gas is predominantly Methane with a gas content of approximately 12 m³/tonne. The Longwall is ventilated with 50 m³/s air. During normal Longwall extraction the CO make at the Tailgate is measured routinely at 15 litres/minute. The mine is negotiating a 3.0m thrust fault which puts an additional 3.0m of coal into the roof strata whilst mining through the faulted area. Mining progress is very slow due to strata conditions and cavities have formed on the Longwall face which have to be periodically filled with cavity fill material.

- a. List 5 and briefly describe what actions the Undermanager should take during this period with regards to the spontaneous combustion potential at the mine? (10 marks)

b. There is a roof fall on the face at 90 chock, 50 metres from the TG. The roof is very broken in this area due to a fault and the goaf has closed up very tight behind the chocks. The goaf consists of very small roof material and coal. The Deputy finds a stream of hot air coming out of the goaf onto the face at this point. He takes a bag sample from the gas at the rear of 88 chock and the following is analysed by the gas chromatograph:

O₂ 12.5%

CO₂ 6.0%

CH₄ 6.1%

CO 120 ppm

H₂ 22 ppm

Ethane 26 ppm

Ethylene 0 ppm

N₂ 75%

i. Briefly describe what actions the Undermanager should take? (5 marks)

ii. What are the possible sources for these gases? (5 marks)

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