



Regional
NSW

CANDIDATE NUMBER: _____ (write in from your letter)

EXAMINATION: Mining engineering manager of underground coal
mines

EXAM PAPER: MB1 – Legislation

DATE: Tuesday 13 February 2024

EXAMINATION

BOOKLET

CANDIDATE NUMBER: _____ **(write in from your letter)**

Question Number	Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
1		20		
	Subtotal	20		
2	a	6		
	b	8		
	c	6		
	Subtotal	20		
3	a	10		
	b	10		
	Subtotal	20		
4	a	16		
	b	2		
	c	2		
	Subtotal	20		
5	a	4		
	b	4		
	c	4		
	d	4		
	e	4		
	Subtotal	20		
PAPER	TOTAL	100		<i>Marks checked by:</i>



**Regional
NSW**

(MB1)

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

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
Mining engineering manager of underground coal mines**

Mining Legislation Paper

Tuesday 13 February 2024
10:50am to 12:00pm (60 minutes)

Venue: Tocal College, Paterson NSW 2421

Room: The Hall

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

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

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

ANSWER BOOKLET

- A HIGHLIGHTER ONLY (no pen/pencil etc) can be used in this part of the exam paper during reading time
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b) How you would comply with these legislative requirements? (8 marks)

	/8
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c) How you would comply with any guidelines? (6 marks)

	/6
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	/10
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Question 4 (total 20 marks)

Section 16 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 notes record of certain reviews of control measures.

a) What is your understanding of this section? (16 marks)

	/16
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b) Section 17 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 also notes record of certain reviews of control measures. What is the fundamental difference between Section 16 and 17? (2 marks)

	/2
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c) What is the general term for the practical process completed to meet the requirements of the above mentioned 2 sections? (2 marks)

	/2
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Question 5 (total 20 marks)

You are the Mining Engineering Manager (MEM) of an underground coal mine that operates a longwall. You have been notified of a situation where a powered hydraulic roof support has advanced when lower command was manually input.

To determine your obligation for notification:

a) What is the consequence criteria for a notification under Section 190 (4 marks)

	/4
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b) What is the probability criteria under Section 190 (4 marks)

	/4
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c) What is the consequence criteria under Section 124 (4 marks)

	/4
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d) What is the probability criteria under Section 124 (5)(a) (4 marks)

	/4
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- e) Under what circumstances would the event above not meet the criteria for notification.
(4 marks)

	/4
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CANDIDATE NUMBER: _____ (write in from your letter)

EXAMINATION: Mining engineering manager of underground coal
mines

EXAM PAPER: MB2 – Mine Ventilation

DATE: Tuesday 13 February 2024

EXAMINATION

BOOKLET

CANDIDATE NUMBER: _____ (write in from your letter)

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
1	a		40		
	b		40		
	c		20		
	Subtotal		100		
2	a		20		
	b		50		
	c		10		
	d		10		
	e		10		
	Subtotal		100		
PAPER	TOTAL		200		<i>Marks checked by:</i>



**Regional
NSW**

(MB2)

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

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
Mining engineering manager of underground coal mines
Mine Ventilation Paper**

Tuesday 13 February 2024
12:50pm to 4:00pm (190 minutes)

Venue: Tocal College, Paterson NSW 2421

Room: The Hall

INSTRUCTIONS TO CANDIDATES

All two (2) questions are to be attempted.

10 minutes reading time is allowed prior to the start of the examination

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

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

ANSWER BOOKLET

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Zulu mine workings are shown on the attached plan

Mine description:

ZULU Mine is an underground coal mine where you have recently been employed as the mining engineering manager and mines the Blue coal seam in the temperate coal measures. It is located in a semi-rural environment with limited surface access over the mine workings because of surface ground features and cliffs due to erosion of fault zones and dykes.

The mine is achieving an average of 15kt per day from 1 longwall resulting in 3.6Mt per annum. There are 4 x development units contributing another 800kt per annum. The Mine operates 5 days per week with 1 maintenance shift scheduled mid-week and additional maintenance activities are conducted on weekends.

Access to the Blue seam is via two surface to seam drifts at a grade of 1:8 and 1200m in length, 6m wide and 5m high.

The Blue seam has the following characteristics:

- on average six metres thick overlain by carbonaceous shales and coal bands,
- a sub bituminous thermal coal with a medium to high propensity to spontaneous combustion,
- dips to the northwest at an average of 1:30,
- known to be wet particularly following significant rain events on the surface,
- the immediate floor is a competent tuff above mudstone and carbonaceous shales and coal bands,
- east of fault #2 there is a low seam gas content up to 2.5m³/t at 90% CH₄,
- the current working domain has seam gas content up to 8m³/t at 90% CH₄,
- rib emission rates in this area are 5 l/s per 100m for solid coal for up to two years after drivage.
- the current working domain north of Charlie Mains is partially overlain with a hard sill that occasionally intrudes into the upper level of the working section of the seam,
- the Golf Mains headings has encountered a very hard 20m thick dyke followed by a 30m downthrow fault #3.
- further drilling indicated a seam gas content of 8 to 12 m³/t of generally 80% CO₂ on the western side of the fault #3 with permeability of 0.44 millidarcy.

- the Golf Mains have been driven by contractors over the previous two years to access this area for future mining.
- rib emission rates from this area west of fault #3 have been measured at an average of 30 l/s per 100m for solid coal.

The working section of the seam is the lower four metres above the tuff layer and below a recognisable seam parting.

A series of downthrow faults have been negotiated to access coal resources to the west.

The mining domains between the fault zones have differing gas, ventilation and geotechnical aspects to manage.

The mine operates one longwall extraction panel and three development units with its own employees. A specialist contracting company assists the mine with operations such as mining in the Golf Mains, secondary support, ventilation works, civil works and assists with longwall relocation activities as required.

	/20
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Question 2

On the accompanying Zulu mine plan;

- a) Show the locations of all production faces, together with their daily production levels, ventilation quantities and expected gas make (20 marks)
- b) Ventilate the plan using the code of signs specified by Survey and Drafting Directions for Mine Surveyors (NSW Mines) addressing issues identified in question 1 (50 marks)
- c) 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 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 as well as the fan operating pressure. (10 marks)

END OF QUESTIONS

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Regional
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CANDIDATE NUMBER: _____ (write in from your letter)

EXAMINATION: Mining engineering manager of underground coal mines

EXAM PAPER: MB3 – Coal Mining Practices

DATE: Wednesday 14 February 2024

EXAMINATION

BOOKLET

CANDIDATE NUMBER: _____ **(write in from your letter)**

Question Number	Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
SECTION A		UNDERGROUND COAL MINING		
1	a		6	
	b		6	
	c		6	
	d		2	
	Subtotal		20	
2	a		3	
	b		3	
	c		4	
	d		5	
	e		5	
	Subtotal		20	
3	a		3	
	b		4	
	c		5	
	d		5	
	e		3	
	Subtotal		20	

Question Number	Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
4	a		3	
	b		4	
	c		7	
	d		6	
	Subtotal		20	
5	a		10	
	b		10	
	Subtotal		20	
6	a		6	
	b		6	
	c		8	
	Subtotal		20	
SECTION B	OPEN CUT COAL MINING			
7	a		4	
	b		4	
	c		6	
	d		6	
	Subtotal		20	
8	a (i)		8	
	a (ii)		8	
	b		4	
	Subtotal		20	

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
Subtotal SECTION A - Underground Coal Mining			80		
Subtotal SECTION B - Open Cut Coal Mining			20		
PAPER	TOTAL		100		<i>Marks checked by:</i>



**Regional
NSW**

(MB3)

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

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
Mining engineering manager of underground coal mines
Coal Mining Practices Paper**

Wednesday 14 February 2024
9:50am to 13:00pm (180 minutes)

Venue: Tocal College, Paterson NSW 2421

Room: The Hall

INSTRUCTIONS TO CANDIDATES

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

- Section A - four (4) out of six (6) underground questions and
 - Section B - one (1) out of two (2) open cut questions

All questions are of equal value - 20 marks each

10 minutes reading time is allowed prior to the start of the examination

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

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

ANSWER BOOKLET

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SECTION A – UNDERGROUND COAL MINING

(Choose only 4 of the following 6 questions to complete)

Question 1 (total 20 marks)

You are the Mining Engineering Manager (MEM) of an underground coal mine. For dewatering purposes, you have decided to drill a large diameter hole from the surface for installation of a submersible pump to remove water from the underground workings. A drilling contractor will be used to drill and case the borehole.

- a) Explain what information you need to supply to the contractor and what information the contractor needs to supply to you? (6 marks)

	/6
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- b) Explain how you would evaluate suppliers to choose a contractor to do the work? (6 marks)

	/6
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c) List the items that you believe would be significant risks for the work and the controls you would expect; (6 marks)

	/6
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d) How would you determine who is responsible and for which individual controls to address the risks? (2 marks)

	/2
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Question 2 (total 20 marks)

You are the Mining Engineering Manager (MEM) of an underground coal mine. There has been an incident in the development panel where during roof trimming with a continuous miner there has been a frictional ignition of methane gas. The ignition resulted in a flame at the roof of the face that was extinguished by the operators using a hose.

This is the first incidence of a frictional ignition. You don't currently have a frictional ignition management plan. In addressing this risk explain:

a) What are your immediate actions after being informed of the incident? (3 marks)

	/3
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b) What are the contributing factors that cause a frictional ignition? (3 marks)

	/3
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c) What are the controls available for each of these casual factors? (4 marks)

	/4
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d) What indicators would you provide to the workforce to actively monitor and control these factors (5 marks)

	/5
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e) Provide an example of the material elements that you would require in a Trigger Action Response Plan (TARP) for development mining with a conventional continuous miner; (5 marks)

	/5
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Question 3 (total 20 marks)

You are the Mining Engineering Manager (MEM) of an underground coal mine that works a 2.1m seam with a mudstone/siltstone floor and a siltstone/sandstone roof. Cut height in development is 2.6m and the longwall minimum is 2.3m. The seam has regular variations to seam thickness and seam rolls. Your Similar Exposure Group (SEG) monitoring is consistently resulting in workers being exposed to Workplace Exposure Standard (WES) concentrations of 50%-100% of the legislated limit, and there has been regular occurrences of failures. In relation to this explain:

- a) What is the issue with exposure to respirable quartz and what does exposure actually mean? (3 marks)

	/3
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- b) What controls are available for addressing the risk (4 marks)

	/4
--	----

c) Explain the process you would implement to understand your sources (5 marks)

	/5
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d) Explain the processes and systems you would implement to monitor this risk (5 marks)

	/5
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e) What other processes are implemented by external parties in relation to this risk (3 marks)

	/3
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Question 4 (total 20 marks)

You are the Mining Engineering Manager (MEM) of an underground longwall mine. The mining schedule has the longwall moving to a new domain on the opposite side of the mains headings. The technical services manager has informed you that this new domain might place the longwall face at risk of windblasts from irregular goafing, particularly when the panel commences and forms the initial goaf. In relation to this risk:

a) What is your understanding of the mechanism of a windblast? (3 marks)

	/3
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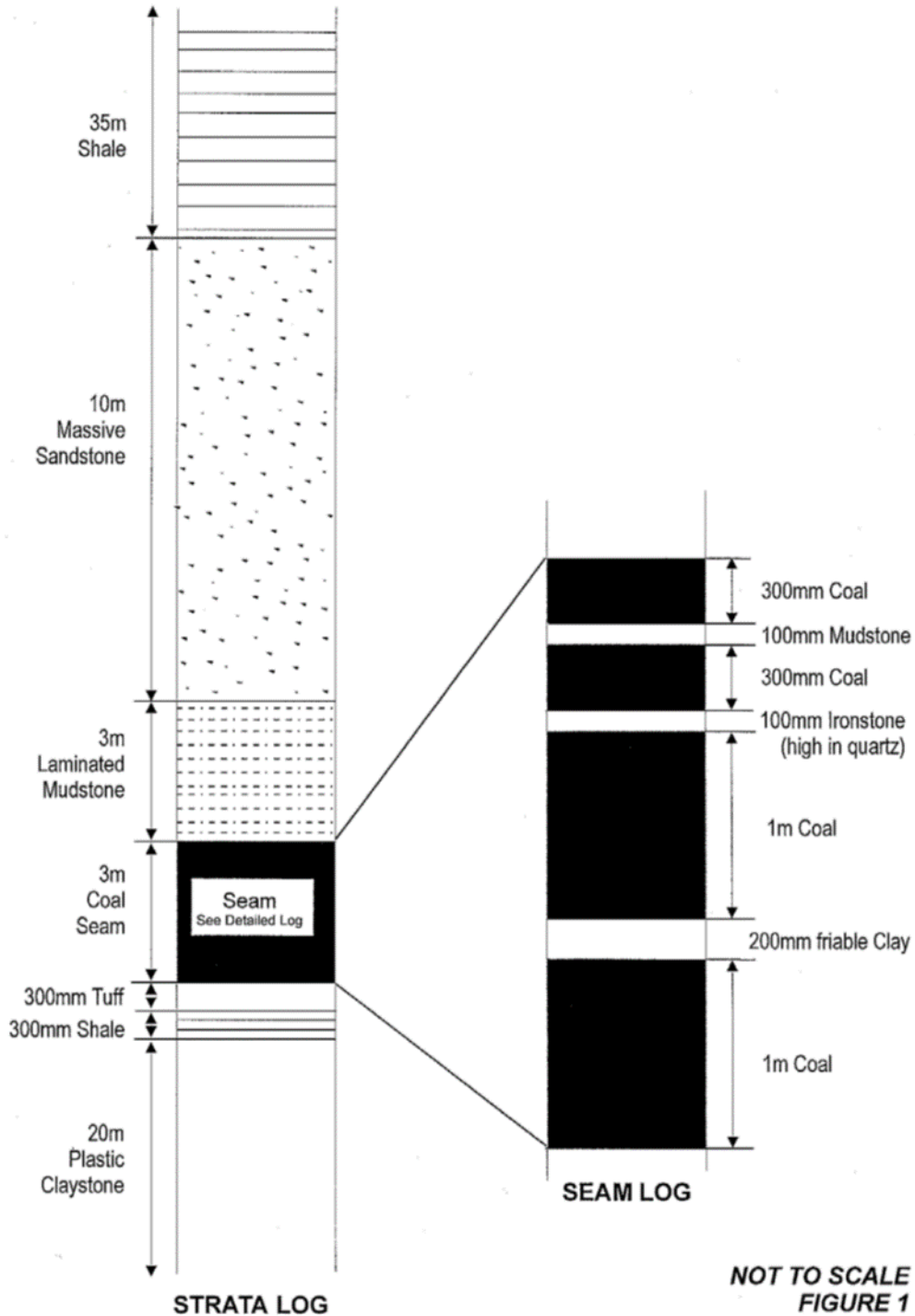
b) What are the physical factors that contribute to this risk? (4 marks)

	/4
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c) What are the controls for the risks? (7 marks)

Question 5 (total 20 marks)

A typical borehole log for a new development area is displayed on Figure 1.



The log shows strata to approximately 50m above the seam and 20m below.

From the above log:

- a) List the potential strata control problems and safety issues that could occur, both during longwall development and longwall retreat. It will be necessary for you to explain your reasoning for each problem listed. The seam is extremely gassy (methane). (10 marks)

/10

b) What actions are required to maintain the mine whilst the fall recovery is taking place? (6 marks)

	/6
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c) Outline the process used to recover the fall and return the mine to normal operation. (8 marks)

	/8
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SECTION B – OPEN CUT COAL MINING

(Choose only 1 of the following 2 questions to complete)

Question 7 – Open Cut (total 20 marks)

You are the Manager of Mining Engineering (MEM) at an open cut mine utilising a fleet of Komatsu 730E and 830E electric drive trucks, Hitachi excavators and Caterpillar ancillary fleet.

While on site, at approximately 10am, you receive a phone call from the Open Cut Examiner (OCE) on shift who informs you that a fitter's ute has failed to give way to a loaded coal truck at a T-intersection, requiring both vehicles to take evasive action to prevent a collision. The light vehicle has made glancing contact with position 3 rear tyre causing minor damage, coming to rest a short distance from the truck. Both drivers appear to be uninjured and are being transported to the first aid room.

- a) As the MEM, what immediate actions would you take to ensure the incident is being managed appropriately and meets site and legislative requirements? (4 marks)

	/4
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- b) Is this matter notifiable to the Regulator? If so, specify the clause and description, notification requirements and next steps. (4 marks)

	/4
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c) Detail the investigation process you will use to identify the causes of the incident and the recommended actions to prevent reoccurrence. (6 marks)

	/6
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d) What verification activities would you include to determine the effectiveness of the actions adopted and the follow up measures taken where deficiencies exist. (6 marks)

	/6
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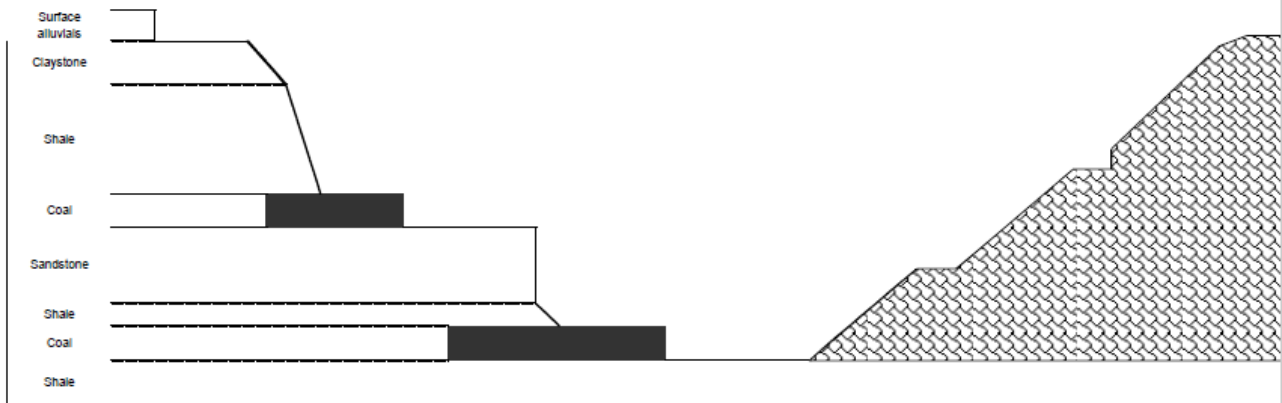
Question 8 – Open Cut (total 20 marks)

You are the appointed Manager of a relatively shallow open-cut mine that utilises truck and shovel methods for both overburden removal and coal extraction. There are 2 seams being extracted both 3m’s thick.

The stratigraphical column for the mine is as below:

Section Thickness (m/s)	Surface	Strata Type
2		Surface alluvials
4		Claystone
9		Shale
3		Coal
7		Sandstone
2		Shale
3		Coal
7		Shale

Typical Operating X-section of Mine



a) With the aid of drawings specify:

- i. The different types of high wall and low wall failure that may be present. State an explanation for the types of failure you identify. (8 marks)
- ii. What precautionary measure you would put in place? (8 marks)

a) i

	/8
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a) ii

	/8
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b) Where, in the mines' Health and Safety System, would you find reference to the management requirements of these precautionary measures? (4 marks)

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END OF QUESTIONS
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