



Regional
NSW

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

EXAMINATION: UNDERMANAGER underground coal mines

EXAM PAPER: UB1 – Mining Legislation

DATE: Wednesday 3 February 2021

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		8	
	b		7	
	c		2	
	d		3	
	Subtotal		20	
2	a		3	
	b		4	
	c		3	
	d		8	
	e		1	
	f		1	
	Subtotal		20	
3	a		4	
	b		9	
	c		3	
	d		4	
	Subtotal		20	
4	a		2	

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
	b		6		
	c		6		
	d		6		
	Subtotal		20		
5			17		
			3		
	Subtotal		20		
PAPER	TOTAL		100		<i>Marks checked by:</i>



Regional
NSW

(UB1)

Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
UNDERMANAGER of underground coal mines**

Mining Legislation Paper

Wednesday 3 February 2021
12:00pm to 1:00pm (60 min)

Tocal College

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 2014

Explosives Act 2003

Explosives Regulation 2013

Explosives Australian Standard AS 2187

ANSWER BOOKLET

- A HIGHLIGHTER ONLY (no pen/pencil etc) can be used in this part of the exam paper during reading time
- If you have a question raise your arm and wait for an exam supervisor
- 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

- b) Clause 39 refers to ensuring exposure standards for dust and diesel particulate matter not exceeded. Complete the missing words or numbers from Clause 39 (1) **(7 Marks)**

The operator of a mine or petroleum site must, _____, minimise the exposure of persons at the mine or petroleum site to dust and diesel particulate matter and must ensure that no person at the mine or petroleum site is exposed to _____ time-weighted average atmospheric concentrations of airborne dust and diesel particulate matter that exceed—

- (i) for respirable dust—_____ milligrams per cubic metre of air, or in the case of a _____, _____ milligrams per cubic metre of air, or
- (ii) for inhalable dust—_____ milligrams per cubic metre of air, or
- (iii) for diesel particulate matter—_____ milligram per cubic metre (measured as sub-micron elemental carbon).

- c) What is the name of the Safework standard referenced in this clause in Q2(b) above? **(2 Marks)**
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-
-
-

d) Government officials are authorised to issue certain notices under WHS laws. Complete the missing words in relation to notices issued under WHS MPS Act 2013. Section 23 of the refers to a notice of _____

Complete the missing words in relation to notices issued under WHS Act 2011.

Section 191 refers to an _____ notice

Section 195 refers to a _____ notice

(3 Marks)

	/20
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Question 2 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 [NSW], Clause 85 requires the preparation of an Inspection Plan.

The following questions are in relation to clause 85:

a) Complete the missing words or numbers from Clause 85 (2) (b): **(3 marks)**

The mine operator of a coal mine must ensure that as part of the inspection plan for the mine:

- a production area is identified in respect of each area of the mine at which coal or mineral is extracted that includes:

(i) in the case of an underground coal mine -, the site of that extraction, any part of the mine within [redacted] metres of the site and, if the production area would be wholly within a [redacted] zone, such other parts of the mine as are necessary to ensure that the production area starts outbye of the [redacted] zone

b) State the requirements of the inspection plan for **production areas** in the following questions: **(4 Marks)**

(i) The presence of what should be inspected prior to connecting power to any plant?

(ii) What is the maximum period (in hours) between inspections of each face area where coal or mineral is being extracted?

(iii) What is the maximum period (in hours) between inspections of all other places where persons work in a production area?

(iv) What is the maximum period (in hours) between inspections of all safely accessible places in a production area?

c) State the requirements of the inspection plan for **places other than production areas** of a mine in the following questions: **(3 Marks in total)**

(i) What is the maximum period (in hours) between inspections of all places where persons work?

(ii) What is the maximum period (in hours) between inspections of all roadways where persons regularly travel?

(iii) What is the maximum period (in days) between inspections of all safely accessible places (including all safely accessible roadways, goaf edges, shafts and drifts)?

d) List a minimum of 8 things that require inspection under an inspection plan? **(8 Marks)**

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e) Inspections may be required more frequently than the minimum specified in Clause 85. Clause 85 stipulates that increased inspection frequency is dependent on what? **(1 Mark)**

(one line short answer)

f) In respect of Clause 85, in the event that the regular routine of inspections of a production area is interrupted, what action is required? **(1 mark)**

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Question 3 (total 20 Marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 [NSW], Clause 65 requires a mine operator to comply with clause 9 in relation to coal dust explosion

The following questions are in relation to clause 65:

a) In complying with the general requirements of clause 65 (1) (a) and (b) in relation to Coal Dust Explosion a mine operator *must* do certain things. List at least 4 of them(**4 Marks**)

b) Complete the missing words or numbers from Clause 65 (1) (c): **(9 Marks)**

In complying with clause 9 in relation to coal dust explosion, the mine operator of an underground coal mine must.

limit or remove coal dust accumulation on roadways and other surfaces in mine roadways to ensure that the amount of incombustible material contained in roadway dust at the mine is kept at or above the following concentration levels—

- (i) for dust in a panel roadway within [] metres outbye the last completed line of cut-throughs in the panel— []
- (ii) for dust in any [] metre section of panel roadway within [] metres of a longwall face— [],
- (iii) for dust in a [] roadway to which subparagraphs (i) and (ii) do not apply— []
- (iv) for dust in an [] roadway to which subparagraphs (i) and (ii) do not apply— [] and

c) State the inspection frequency of roadway dust layers by an individual nominated to exercise the function of roadway dust sampler at the mine: **(3 Marks in total)**

(i) In the case of a face zone

(ii) Outbye Return or Belt conveyor Roadway

(iii) Other outbye Roadways

d) Complete the missing words or numbers in the requirements for the application of stone dust or other explosion inhibitor to any new section of roadway **(4 Marks total)**

(i) no more than of the new section is left without an application of stone dust or other explosion inhibitor at any time while the section is being driven, and

(ii) no part of the new section is left without an application of stone dust or other explosion inhibitor for more than (not including any day on which no mining operations occur at the mine).

	/20
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Question 4 (total 20 marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 [NSW], Part 2, Division 4, Subdivision 1, Clause 27 refers to Operational Controls relating to Communications.

The following questions are in relation to Clause 27, *Communication between outgoing and incoming shifts*:

The Operator of a mine site at which more than one shift is worked each day must implement a system of communication,

a) When must this communication take place? (2 Marks)

b) The Supervisor of the Outgoing shift must provide what to the supervisor of the incoming shift? (6 Marks)

c) The Supervisor of the outgoing shift must acknowledge what, to the Supervisor of the incoming shift? (6 Marks)

d) What must the supervisor of the incoming shift provide workers of the incoming shift? (6 Marks)

	/20
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Question 5 (total 20 Marks)

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 [NSW], Division 6, Subdivision 1, deals with emergency Management for a mine Clause 88 refers to the preparation of an Emergency Management Plan and Clause 93 relates to testing of the Emergency Plan.

The following questions are in relation to Clause 88 and Clause 93:

Clause 88 requires the Operator of a mine site to prepare an emergency plan for the mine,

- a) In addition to the matters required by Clause 43(1) of the WHS Regulations, what aspects of emergency response are required for underground mines? **(17 Marks)**

b) What are the requirements of testing the emergency plan? **(3 Marks)**

/20

END OF QUESTIONS
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Regional
NSW

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

EXAMINATION: UNDERMANAGER underground coal mines

EXAM PAPER: UB2 – Mine Ventilation

DATE: Wednesday 3 February 2021

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		30	
	b		5	
	c		20	
	d		10	
	e		35	
	Subtotal		100	
2	a		10	
	b		10	
	c		10	
	d		20	
	e		50	
	Subtotal		100	
PAPER	TOTAL		200	<i>Marks checked by:</i>



(UB2)

Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
UNDERMANAGER of underground coal mines**

Mine Ventilation Paper

Wednesday 3 February 2021
1:30pm to 3:30pm (120 min)

Tocal College

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.

**Please write your candidate number
on your mine plan,
above the mine name box,
to be seen when folded back in its plastic cover**

ANSWER BOOKLET

- A HIGHLIGHTER ONLY (no pen/pencil etc) can be used in this part of the exam paper during reading time
- If you have a question raise your arm and wait for an exam supervisor
- Answers are to be written in the allocated spaces within this booklet **and the provided mine plan ONLY**
- Answers must be written in pen however, drawings may be completed in pencil/coloured pencil
- This booklet is not to be altered in any way, pages are not to be added or removed

Question 1 (100 Marks)

Mount Breken Extended Colliery has 2 x continuous miners in tandem on development and 1 x longwall face LW 24 which alone produces 14,000 tonnes of coal per day on a Monday to Friday production roster of 3 x 9-hour shift per day.

The operation mines the Upper 3.2 metres of the “Greater Northern Seam” with total coal seam thickness being 3.9 metres. The seam is moderately gassy with a methane content of 6.5 m³/tonne. Historical data indicates that 50% of the gas content of the CUT coal is liberated during production.

The seam is considered to have a reasonably consistent grade across the lease. Water make in the mine is considered substantial.

The operation is developing the last LW block, in the South Western area of the lease.

Note Data for three DDH exploration drill holes, is recorded on the plan identifying the seam RL level

The Mine is considered to have a medium propensity to Spontaneous Combustion.

On the accompanying Plan UMB-V1 show;

1. Using the code of signs, show the ventilation system you would adopt to ventilate this mine, **(30 Marks)**

/30

2. The air quantities entering each production district at the start of the Hazardous zone, **(5 Marks)**

/5

3. The duty point of the Main mine fan(s), the air power and the motor power required by the fan(s). **(20 Marks)**

/20

4. The position of the gas monitoring points, include the gases which need to be monitored. **(10 Marks)**

/10

5. Identify and explain the ventilation hazards / challenges posed by the mine design / layout, provide brief explanation of appropriate controls for these hazards **(35 Marks)**

Note; Candidates must show all calculations.

Clearly state assumptions you are relying upon in these calculations and why you have chosen these assumptions

Ensure that your candidate examination number is clearly stated on the plan

/35

END OF QUESTION 1

Question 2 (Worth a total of 100 Marks)

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

Ignition of flammable gases in coal mines can have devastating results. To allow the risks associated with gases to be managed it is important that mining officials and particularly Undermanagers understand the properties of mine gases and mitigation methods.

a) List and describe five methods whereby methane can be ignited underground. (10 Marks)

/10

b) Describe what measures can be taken to prevent each of these five sources of ignition from igniting methane you have identified in (a). **(10 Marks)**

/10

c) Methane is the most common and the most dangerous of the flammable gases encountered in mining. **(10 Marks)**

I. What is its specific gravity?

II. What are its explosive limits?

III. What is methane layering?

IV. How do you detect a methane layer?

V. How do you remove a methane layer?

/10

- d) Graham's Ratio was derived as a measure of the intensity of the oxidization of coal. Commonly grahams ratio is included in many mine operations Spontaneous Combustion TARP's.
It is valuable knowledge for an Undermanager to understand how Grahams Ratio is determined **(20 marks)**

In the following scenario, using the following data from your gas monitoring determine the GR of this sample:

- Oxygen - 18.8 %
- Nitrogen - 79.60 %
- Carbon monoxide - 104 ppm
- Methane - 1.4%

i. What is the calculated GR? **(5 Marks)**

ii. What does this answer tell you about what is happening? **(5 Marks)**

iii. What would your response be to this GR level? **(5 Marks)**

iv. What are the generally indicative GR levels in Australia and what does each level indicate? **(5 Marks)**

/20

iii. What actions do you take? (20 Marks)

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Regional
NSW

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

EXAMINATION: UNDERMANAGER underground coal mines

EXAM PAPER: UB3 – Coal Mining Practice

DATE: Thursday 4 February 2021

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
Select and attempt a total of 5 only of 8 questions	1	a	2		
		b	2		
		c	6		
		d	8		
		e	1		
		f	1		
		Subtotal	20		
	2	a	5		
		b	5		
		c	10		
		Subtotal	20		
	3	a	4		
		b	4		
		c	8		
		d	4		
		Subtotal	20		

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
4	a		3		
	b		4		
	c		3		
	d		4		
	e		4		
	f		2		
	Subtotal		20		
5	a		3		
	b		8		
	c		2		
	d		7		
	Subtotal		20		
6	a		10		
	b		10		
	Subtotal		20		
Select and attempt a total of 5 only of 8 questions	a		5		
	b		5		

Question Number		Mark	Available mark	Marked by <i>Name</i>	Summary comments to justify, as necessary
7			5		
			5		
	Subtotal		20		
8	a		5		
	b		5		
	c		5		
	d		5		
	Subtotal		20		
PAPER	TOTAL		100		<i>Marks checked by:</i>

(UB3)

Work Health and Safety (Mines and Petroleum Sites) Act 2013
Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

**EXAMINATION FOR CERTIFICATE OF COMPETENCE
UNDERMANAGER of underground coal mines**

Coal Mining Practice Paper

Thursday 4 February 2021
10:00am to 1:00pm (180 min)

Total College

INSTRUCTIONS TO CANDIDATES

You must **select five of the eight questions** to attempt.

All questions are of equal value - 20 marks each

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

Question 1 (total 20 Marks)

On afternoon shift at approximately 5pm the auxiliary forcing fan ventilating the single entry inbye of the longwall face had tripped and power was lost for 5 hours. The repairs have now since been completed and the fan is powered, however not running. This has caused an increase of CH₄ in the single entry inbye roadway to a known detection of 3% within the general body air.

You are the nightshift Undermanager. During your handover with the afternoon shift Undermanager you are informed that the afternoon shift longwall crew are producing on the longwall on an overtime shift whilst the nightshift crews are in transit into the mine.

- a) What hazards could arise if you allow afternoon shift to continue producing?

(2 Marks)

	/2
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- b) What hazards could arise if you instruct the afternoon shift crew to cease producing in preparation to address the CH₄ concentration inbye of the longwall face? **(2 Marks)**

	/2
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	/8
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e) Under what clause within the WHS MPS Regulations 2014 is this incident required to be notified to the regulator? **(circle the correct response - 1 Mark)**

- I. CL 128
- II. CL 129
- III. CL 179

	/1
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f) When must this incident be notified to the regulator? **(circle the correct response - 1 Mark)**

- a. Immediately
- b. As soon as reasonably practicable, no later than 24 hours
- c. As soon as reasonably practicable, no later than 48 hours
- d. As soon as reasonably practicable, no later than 7 days

	/1
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Total marks:	/20
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/5

C) You are the weekend night shift undermanager. At the start of the first shift on roster, you are made aware through written shift planning instructions from the Outbye Superintendent that contractors have been engaged to commence the following operations on this shift:

- Install additional roof support (mesh and roof bolts) in an outbye conveyor belt roadway.
- The roof support is planned to be installed adjacent to the operating conveyor during production. A procedure for the task has been supplied which has been jointly prepared by the Outbye Superintendent and the contracting company supervisor.

i. What actions should the undermanager take to verify training and competency of the contract workers? List 3 actions. **(3 Marks)**

/3

- ii. What actions should be taken by the undermanager in respect of reviewing and implementing the procedure for the task? List 3 actions. **(3 Marks)**

	/3
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- iii. What should be done and/or implemented by the undermanager to achieve and verify compliance and safety of the task during the course of the shift? List 4 actions. **(4 Marks)**

	/20
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Question 3 (total 20 Marks)

1. You are the undermanager of a longwall mine which has just commenced a long wall recovery with the recovery of powered roof supports having commenced. The majority of the longwall support have been removed with the roof heavy with some tearing of the recovery mesh and material flushing in front of the E frame and walker supports. You receive a phone call from the Longwall that a tradesperson in the longwall has received a severe fluid injection injury when disconnecting a powered roof support that was being moved off the longwall face.

a) List four pieces of information you as the undermanager should immediately seek?
(4 Marks)

	/4
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b) What instructions should you as the undermanager immediately issue? List four instructions. **(4 Marks)**

d) As shift undermanager – identify four processes that you would use to ensure that your workers understand the tasks and the risks associated with the tasks that they have been given and other activities that are occurring on your shift?.**(4 Marks)**

	/4
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Question 4 (total 20 Marks)

You are the undermanager of a longwall mine which is part way through the recovery of longwall roof support shields from the completed panel. You are notified early in the shift that a roof fall has occurred in front of the walker shields. The roof comprises 4.0m of laminated mudstones and siltstones overlain by strong competent sandstone. The fall is reported to have torn through the recovery mesh, is 4m high and extends from the goaf breaker cribs across in front of the goaf side walker shield.

A) List three pieces of information the undermanager should immediately seek?

(3 Marks)

	/3
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b) What instructions should the undermanager immediately issue? List four instructions.

(4 Marks)

	/4
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c) What actions or controls should the undermanager take to minimise the risk of another fall during recovery of the fall? List three actions. **(3 Marks)**

	/3
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d) List four steps the undermanager take should in developing a plan to recover the fall and enable recommencement of shield recovery? **(4 Marks)**

	/4
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- e) Briefly describe two possible methods of recovering the fall to enable recommencement of shield recovery? **(4 Marks)**

	/4
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- f) As part of the fall recovery method and the controls you develop, list two measures that could be implemented to minimise exposure of personnel to elevated risk areas. **(2 Marks)**

	/2
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Total marks:	/20
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Question 5 (total 20 Marks)

You're an Undermanager in a small bord and pillar mine that will soon begin extracting coal by pillar extraction. You have been tasked by the mining engineering manager with preparing a pillar extraction management plan.

a) What teams should be consulted with in preparation for the development of this new management plan? **(3 Marks)**

	/3
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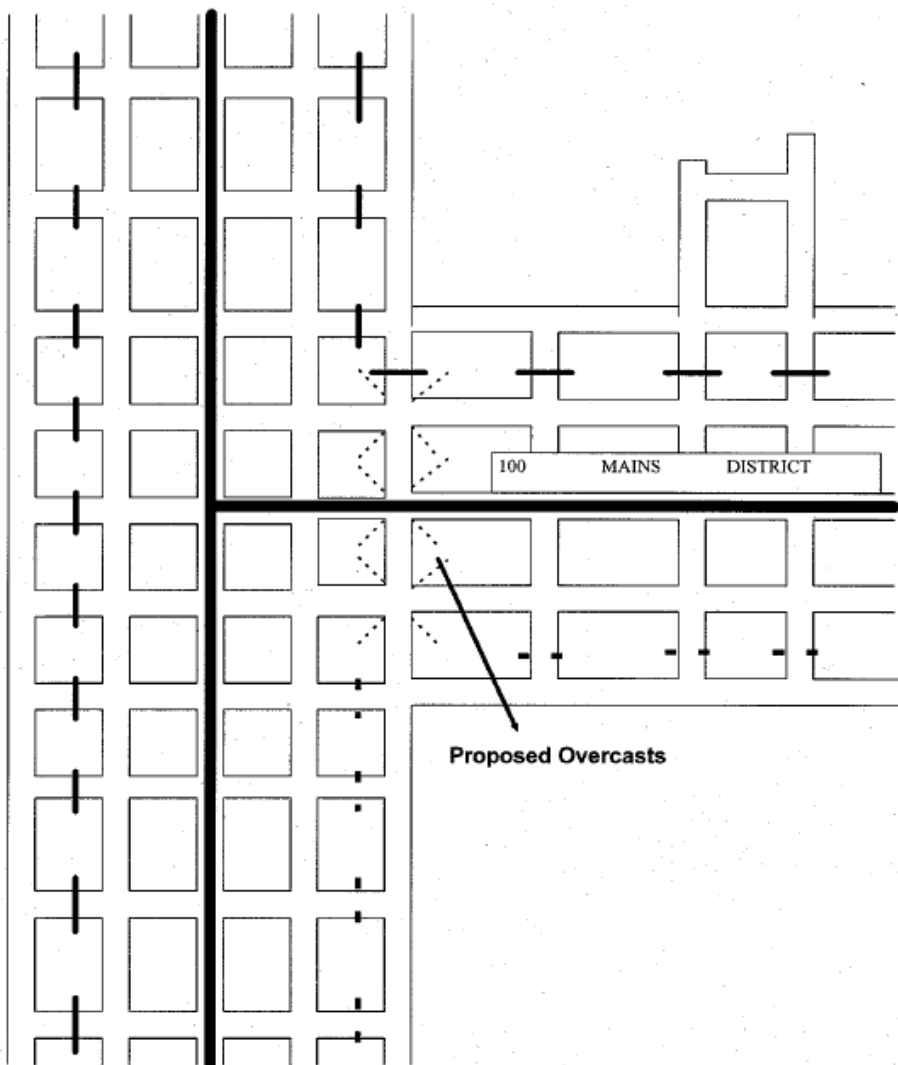
b) Briefly outline the steps that should be taken when developing a new management plan? **(8 Marks)**

Question 6 (total 20 Marks)

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

A submains panel is being developed (5 headings wide) off the mains headings of the mine you work at. Increasing gas levels require reduction in mine resistance through the construction of additional overcasts to allow for the implementation of dual returns. The location of proposed overcasts is indicated on Plan “A”:

PLAN "A" - QUESTION 6



The working height is 2.8 metres and the immediate roof consists of 600mm of coal overlain by laminated shales. The lifecycle of the proposed overcast line is anticipated to be required for the long term viability of the mine with up to 50 % of the total mine ventilation passing over them. The conveyor installation is located in the centre heading of both the mains and the sub-mains.

Currently the mine is operating 5 days per week.

Question 7 (total 20 Marks)

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

- a) Explain the process of spontaneous combustion in an active longwall goaf, and how/when can this result in a heating? **(5 Marks)**

	/5
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- b) What are the likely indicators of spontaneous combustion in a longwall and how would you apply these indicators as a shift Undermanager? **(5 Marks)**

	/5
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- c) What are the principle means to mitigate a heating in the goaf from occurring? **(5 Marks)**

	/5
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d) What are 5 techniques available to combat an active heating in a goaf? (5 Marks)

	/5
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Total marks:	/20
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Question 8 (total 20 Marks)

You are the nightshift undermanager of a longwall mine. The mine uses a pre driven recovery road and the longwall has just holed the pre driven recovery road .Roof conditions leading up to the holing have been poor and as a result the retreat rate has been slower than predicted.

The seam being extracted is 4m high and generally has low to moderate methane levels. Ventilation quantity across the face is 40m³/s.

You have been contacted by the LW deputy who has advised that he has elevated gas levels of greater than 2% around the first four powered longwall supports and around the last four longwall supports. He mentions that air quantity appears lower than normal.

a) List five pieces of information the undermanager should immediately seek? (5 Marks)

	/5
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b) What instructions should the undermanager immediately issue? List four instructions. (5 Marks)

	5
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c) How would you address this issue and allow for the LW to recommence production?

Note: the deputy has contacted control and confirmed that the total ventilation quantity is 40m³/s

(5 Marks)

	5
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d) Identify the key risks associated with the use of pre-driven recovery roads (5 Marks)

END OF QUESTIONS

END OF PAPER

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