



Trade &  
Investment  
Mine Safety

(CME1)

## NSW Coal Competence Board

### EXAMINATION FOR CERTIFICATE OF COMPETENCE AS Mine Mechanical Engineer

*(Coal Mine Health and Safety Act 2002)*

**Wednesday 21 August 2013 - 9.30am to 12.30pm**

**Mechanical engineering applicable to underground coal mines**

#### INSTRUCTIONS TO CANDIDATES

Unless otherwise stated all references to *Regulations* are to the *Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Regulation 2011*.

It is expected that candidates will present their answers in an engineering manner making full use of diagrams, tables, and relevant circuits where applicable and showing full working in calculations.

Credit marks will be given for such work in assessing marks for these questions.

Neatness in diagrams is essential and will be considered in the allocation of marks.

Provide answers in point form wherever appropriate.

Electronic aids may not be used

**5 only questions** are to be attempted of which **Questions 1 to 4 are Compulsory** with the remaining question to be selected from questions 5 to 8.

*All questions are of equal value but parts of questions may vary in value*

Place your identification number only, NOT your name, on your paper

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

Candidates can highlight points of importance during the reading time, using highlighters, but not begin answering the questions

**Closed book exam**

**Question 1 Compulsory** (Total 60 marks)

Your mine has decided to overhaul/upgrade a number of your longwall roof supports at the completion of the next longwall block.

It has been decided to undertake the works in house due to budget constraints.

You have been asked by the operator to identify and prioritise the repair works.

Preliminary lists of repairs and upgrades have been provided by the longwall engineer; these include mechanical component replacement, hydraulic component replacement, welding repairs and some modifications and upgrades.

- a) What sources of information would you access to help develop and prioritize the work scope? (10 marks)
- b) What documentation would you consult, to help you develop your standards for the work to be carried out? (10 marks)
- c) What type of risk based approach/es would you consider and why? (10 marks)
- d) How would you determine if your tradespersons, including both mine site employees and contractors, have suitable competencies to undertake the works? (10 marks)
- e) What are the supervision arrangements, considering this work is being undertaken for 10 days on a 24 x 7 schedule? (10 marks)
- f) How are you going to satisfy yourself the works being undertaken at the mine are without risk to health and safety of persons? (10 marks)

**Question 2 Compulsory** (Total 60 marks)

You are currently drafting a tender document for the acquisition of new rubber tyred personnel transports (RTV) for your operation:

- a) List the reference material you are going to consult to help you develop the tender specification. (10 marks)
- b) What information are you going to ask the suppliers to provide as part of the tender submission and why? (10 marks)
- c) How do you intend to introduce new technology being offered by the suppliers to your operation? (10 marks)
- d) What criteria are you going to apply to evaluate the reliability of the new personnel transports? (10 marks)
- e) Upon introduction to site, the units are continually plagued with diesel EX failures to a fixed joint on the exhaust manifolds. What is your intended action? (10 marks)
- f) How do you intend communicating this issue with the original equipment manufacture (OEM) and Industry? (10 marks)

**Question 3 Compulsory** (Total 60 marks – 4 marks each part)

Multiple choice questions - please circle the correct answer

- a) Run type ladders operate between:
- i) 45 to 60 degrees
  - ii) 60 to 70 degrees
  - iii) 70 to 90 degrees
  - iv) None of the above
- b) The clear width of a walkway platform is:
- i) 550mm
  - ii) 600mm
  - iii) 650mm
  - iv) 700mm
- c) A Non destructive rope test report does **NOT** include:
- i) Date of test
  - ii) Origin of rope manufacture
  - iii) Date of rope installation
  - iv) Test equipment used.
- d) The top rail of a walkway shall be at a vertical height of:
- i) Not less than 500mm, not more than 1100mm
  - ii) Not less then 600mm, not more than 1100mm
  - iii) Not less than 750mm, not more than 1100mm
  - iv) Not less than 900mm, not more than 1100mm
- e) When testing open joints on the inlet or exhaust system of a diesel engine system, what is the maximum thickness of the feeler gauge that should be used?
- i) Less than 0.5mm
  - ii) Less than 0.2mm
  - iii) Less then 0.3mm
  - iv) Less than 0.1mm
- f) The gap between the toe-board and the floor of a walkway should not exceed:
- i) 10mm
  - ii) 15mm
  - iii) 20mm
  - iv) None of the above
- g) What is the definition of a conveyance?
- i) A carriage
  - ii) A skip
  - iii) A stage
  - iv) All of the above

- h) What minimum distance should gas fuel cylinders be stored away from fuel bays, fuel outlets and mobile equipment under repair?
- i) 5 metres
  - ii) 10 metres
  - iii) 15 metres
  - iv) 20 metres
- i) The MDG for Fluid power systems safety at mines is:
- i) MDG 10
  - ii) MDG 16
  - iii) MDG 36
  - iv) None of the above
- j) All signs, labels and warning notices should be designed and installed in accordance with:
- i) AS 1318
  - ii) AS 1319
  - iii) AS 1318 & AS 1319
  - iv) None of the above
- k) Wire ropes may deteriorate due to some of the cumulative effects of the following:
- i) Lightning strikes
  - ii) Localised heating
  - iii) Fretting
  - iv) All of the above
- l) In developing a coal operations welding (hot works) management plan you would consult:
- i) MDG 25
  - ii) MDG 15
  - iii) MDG 28
  - iv) All of the above
- m) Which of the following has the lowest ignition temperature?
- i) CH<sub>4</sub>
  - ii) Diesel fuel
  - iii) Non Fire resistance polyurethane
  - iv) 50 mm layer of high volatile NSW coal dust
- n) When the outer wire of a Langs Lay rope wire rope has lost 30% of the diameter of the outer wires and wear equates to 4.3% LMA (by NDT), what is the % rope strength loss would you reasonably expect?
- i) 10%
  - ii) 30%
  - iii) 60%
  - iv) 4.3%

- o) An underground trunk conveyor some 2000 m long is **NOT** required to be fitted with which safety feature:
- i) Emergency stop switches installed every 30m and accessible from both sides if access is available on both sides of the conveyor
  - ii) Emergency pull wire system along both side of the conveyor if access is available on both sides of the conveyor
  - iii) Prestart warning system
  - iv) Belt tracking limits

**Question 4 Compulsory** (Total 60 marks)

A Load Haul Dump vehicle (LHD) has hit a pedestrian and broken his leg. The manager is at the hospital and has told you to handle all issues related to this incident.

- a) List in sequence, the steps you would take to investigate this incident on behalf of the Mine Manager. (6 marks)
- b) List who would participate in the investigation. (6 marks)
- c) Identify the documents that you would consult with. (6 marks)
- d) List the items/issues which may have contributed to this incident. (6 marks)
- e) Identify the barriers to this type of accident which typically exist at most mines. (6 marks)
- f) Identify the additional barriers to risk that you would recommend: (6 marks)
  - In the short term
  - In the longer term
- g) Identify how you would implement an improvement program and list the programs content. (6 marks)
- h) Recommend and identify an audit program to ensure the improvements have been effectively implemented. (6 marks)
- i) List the legislation and the content of the legislative clauses which would typically apply to this incident. (6 marks)
- j) List the basic items you would include in the specification for a new loader which would significantly reduce the potential for this type of accident. (6 marks)

**Question 5 Elective** (Total 60 marks)

You have recently had a number of notifiable incidents on your underground conveyor system.

From your inspection with the Government Official it has been determined that a number of control devices on your conveyor system although in place, are not effective.

As a result of the Government Officials finding, an Improvement notice, under *Section 191 Work Health & Safety Act*, has been issued to the operator to improve certain things on the underground conveyor system.

Describe how you would install (including location), settings, testing and the continual monitoring of the effectiveness of the following:

- a) Tracking switches (6 marks)
- b) Bearing temperature sensors (6 marks)
- c) Seized shaft protection (6 marks)
- d) CO monitoring (6 marks)
- e) Smoke detection (6 marks)
- f) CH<sub>4</sub> monitoring (6 marks)
- g) Rip belt detection (6 marks)
- h) Run back detection (6 marks)
- i) Blocked chute (6 marks)
- j) Belt overrun (6 marks)

**Question 6 Elective** (Total 60 marks)

A change in geology at your operation has required the mining process to go to single pass drilling for the installation of primary roof support at the face.

As a result of this change it has been reported to you there has been an increase in the number of drilling steels failing due to bending.

You are also aware of a similar incident at a local mine where an operator was seriously injured (head injuries) when hit by a bent drill steel.

- a) Describe the methodology you would used to determine the causal factors of bending drill steels (15 marks)
- b) List 5 possible causal factors that could led to the drill steel bending during the drill process (15 marks)
- c) List 5 control measures you could implement to prevent the drill steel from bending (15 marks)
- d) What will be your long term strategy in eliminating the hazards of bending drill steels? (15 marks)

**Question 7 Elective** (Total 60 marks)

You are the Manager of Mechanical Engineering of an old coal operation; as such you have recognised that some of the surface structures and buildings are in need of repairs or maintenance. Works include but not limited to:

- Excavation works
- Demolition works
- Asbestos removal
- Working at heights requiring the erection of scaffolding
- The cladding of roofs and external walls

- a) Describe how you intend to control the working area? (15 marks)
- b) List 7 specific risk controls which would apply to structures and buildings undergoing repairs and maintenance. (15 marks)
- c) List 7 codes of practice you would consult for guidance to control the works. (15 marks)
- d) List 5 certificates of competency required for the types of works being carried out. (15 marks)

**Question 8 Elective** (Total 60 marks)

- a) The following is a list of drift slope haulage protections systems as listed in MDG 33. From the list, state the purpose of each device, the method of operation for each device and typical location of each device.

Sketches may be used to assist in your answers. (12 marks)

- i) Slack rope monitor (3 marks)
  - ii) Safe coil device (3 marks)
  - iii) End of travel track limit (3 marks)
  - iv) End of track limit (3 marks)
- b) Describe 3 methods used for the inspection and testing of a drift slope winder rope and include the advantages and disadvantages of each of the methods. (12 marks)
  - c) Describe the operation of the following brake functions on a drift slope winder: (12 marks)
    - i) Service brakes (4 marks)
    - ii) Parking brakes (4 marks)
    - iii) Emergency brakes (4 marks)
  - d) Describe the methods for testing each of the above brake functions. (12 marks)
  - e) Describe the methods used for the prevention and detection over speed on a drift slope winding system. (12 marks)

**END OF QUESTIONS**

**END OF PAPER**



(CME2)

## NSW Coal Competence Board

### EXAMINATION FOR CERTIFICATE OF COMPETENCE AS Mine Mechanical Engineer

*(Coal Mine Health and Safety Act 2002)*

Wednesday 21 August 2013 - 1.30pm to 2.30pm

#### Legislation and Standards applicable to Underground Coal Mines

#### INSTRUCTIONS TO CANDIDATES

Unless otherwise stated all references to *Regulations* are to the *Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Regulation 2011*.

It is expected that candidates will present their answers in an engineering manner making full use of diagrams, tables, and relevant circuits where applicable and showing full working in calculations.

Credit marks will be given for such work in assessing marks for these questions.

Neatness in diagrams is essential and will be considered in the allocation of marks.

Provide answers in point form wherever appropriate.

Electronic aids may not be used

#### **All questions are to be attempted**

All questions are of equal value but parts of questions may vary in value

Place your identification number only, NOT your name, on your paper

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

Candidates can highlight points of importance during the reading time, using highlighters, but not begin answering the questions

**Open book exam**



**Question 1 (Total 20 marks)**

**Work Health & Safety Regulation 2011**

**Managing risk to health and safety - Part 3.1**

- a) Who has a duty to manage risks to health and safety at a work place? (5 marks)
- b) What must a duty holder do with regard to the management of risks? (5 marks)
- c) How can a duty holder control risks to health and safety if it is not reasonably practical for the risks to health and safety to be eliminated? (5 marks)
- d) When is a duty holder required to review and revise necessary control measures? (5 marks)

**Question 2 (Total 20 marks)**

**Work Health & Safety Regulation 2011**

With the introduction of the *Work Health & Safety Regulation 2011* you are reviewing your “**Part 4.3 Confined spaces**” management plan to ensure it reflects current requirements.

- a) What information is required to be on a confined space permit? (5 marks)
- b) How would you determine the risk control measures for the confined space? (5 marks)
- c) What are the responsibilities for the duty holder (PCBU) at the completion of the works? (5 marks)
- d) How would a PCBU clearly identify a confined space to a worker? (5 marks)

**Question 3 - Coal Mine Health & Safety Regulation 2006 (Total 20 marks)**

- a) What are the responsibilities of the operator with regard to exposure of “**Diesel particulate matter**”? (5 marks)
- b) List 5 control measures which could be implemented to control diesel particulate matter at an underground operation. (5 marks)
- c) How can diesel particulate matter be measured? (5 marks)
- d) What is an acceptable level of diesel particulate matter? (5 marks)

**Question 4 - Coal Mine Health & Safety Regulation 2006 (Total 20 marks)**

**Isolation arrangements**

- a) What management plan is going to be used to control isolation arrangements at your operation? (5 marks)
- b) Give 5 examples of how you would control specific isolation arrangements at your operation. (5 marks)
- c) What is meant by group or gang isolation arrangements? (5 marks)
- d) What process would you use to ensure compliance with the operation's isolation arrangements? (5 marks)

**Question 5 Gazettal - legislative update. (Total 20 marks)**

**“Requirements for Design registration of powered winders” (Attached over page)**

Your upgraded winder requires recertification for the purposes of design registration.

- a) Who can undertake the recertification? (5 marks)
- b) What is the person in a) above, required to confirm? (5 marks)
- c) What is meant by “reviewing any alterations to the powered winding system”? (5 marks)
- d) Describe what is meant by “functional safety approach” when assessing a powered winding system. (5 marks)

**END OF QUESTIONS**

**END OF PAPER**

**OCCUPATIONAL HEALTH AND SAFETY ACT 2000****Notice under clause 112A of Occupational Health and Safety Regulation 2001****Requirements for design registration of powered winding systems**

I, ROBERT REGAN, Chief Inspector under the Coal Mine Health and Safety Act 2002, , pursuant to clause 112A of the *Occupational Health and Safety Regulation 2001* (the Regulation), by this notice, specify the requirements set out in the Schedule below as the requirements that must be met prior to powered winding systems (of a type listed in the Table to clause 107 as modified by Schedule 4A of the Regulation) used in underground mines at a coal workplace (referred to in this notice as powered winding systems) being registered under Subdivision 1 of Division 3 of Part 5.2 (as modified by that Schedule) of the Regulation.

Dated this 29<sup>th</sup> day of January 2007.

**ROBERT REGAN**  
Chief Inspector  
NSW Department of Primary Industries  
(by delegation)

**Schedule****1.0 DESIGN REQUIREMENTS**

All powered winding systems must be designed, manufactured, installed and commissioned in accordance with:

- a) MDG 33:1998, '*Guideline for design, commissioning & maintenance of drum winders*', and
- b) MDG 2005:2003, '*Electrical technical reference for the approval of power winding system*' as applicable.

In addition, the following guideline and standards must be used in the design, construction and commissioning, as applicable for relevant components which constitute the powered winding system.

***Mine Design Guidelines***

MDG 12:1992    *Guideline for the construction of friction winders*

MDG 26:1999    *Guideline for the examination, testing and discard of mine winder ropes*

MDG 33:1998    *Guideline for design, commissioning & maintenance of drum winders*

MDG  
2005:2003        *Electrical technical reference for the approval of power winding system*

***Australian Standards***

AS  
1554.1:2004        *Structural steel welding - Welding of steel structures*

AS 3600:2001	<i>Concrete structures</i>
AS 3637.1:2005	<i>Underground mining - Winding suspension equipment - General requirements</i>
AS 3637.2:2005	<i>Underground mining - Winding suspension equipment - Detaching hooks</i>
AS 3637.3:1997	<i>Underground mining - Winding suspension equipment - Rope cappings</i>
AS 3637.4:2002	<i>Underground mining - Winding suspension equipment - Drawbars and connecting links</i>
AS 3637.5:2005	<i>Underground mining - Winding suspension equipment - Rope swivels and swivel hooks</i>
AS 3637.6:2005	<i>Underground mining - Winding suspension equipment - Shackles and chains</i>
AS 3751: 2005	<i>Underground mining - Slope haulage - Couplings, drawbars, and safety chains</i>
AS 3785.1:2006	<i>Underground mining - Shaft equipment - Shaft overwind safety catch system</i>
AS 3785.2:2006	<i>Underground mining - Shaft equipment - Shaft winding arresting systems</i>
AS 3785.3:2005	<i>Underground mining - Shaft equipment - Drum winding gripper systems</i>
AS 3785.4:2002	<i>Underground mining - Shaft equipment - Conveyances for vertical shafts</i>
AS 3785.5:1998	<i>Underground mining - Shaft equipment - Headframes</i>
AS 3785.6:1996	<i>Underground mining - Shaft equipment – Guides and rubbing ropes for conveyances</i>
AS 3785.7:2006	<i>Underground mining - Shaft equipment – Sheaves</i>
AS 3785.8:1994	<i>Underground mining - Shaft equipment - Personnel conveyances in other than vertical shafts</i>
AS 3990:1993	<i>Mechanical equipment - Steelwork</i>
AS 4100:1998	<i>Steel structures</i>
AS 4812:2003	<i>Non-destructive examination and discard criteria for wire ropes in mine winding systems</i>

## 2.0 CERTIFICATION

A qualified practicing engineer(s) registered on the National Professional Engineers Register (administered by Engineers Australia) or a qualified practicing engineer acceptable to the chief inspector must undertake the following:

- a) Confirm that the design of the powered winding system, as identified by a series of drawings, test certificates and other documents, meets the requirements of MDG 33 and MDG 2005, unless specifically stated.

Where a non-conformance to MDG 33 or MDG 2005 is identified the confirmation must state the non-conformance and how, in the qualified engineer's opinion, an equivalent level of safety is provided or the requirement is not relevant to the particular powered winding system.

- b) Identify and state any technical specifications as required for the manufacture, assembly, testing and commissioning of the powered winding systems and its components, to meet the above requirements and standards.
- c) Confirm the design of each safety critical component of the powered winding system identifying the component and stating the design loads, standards and conditions to which the certification is applicable.
- d) Review any alterations to the powered winding system.

Notes:

1. For existing winders, copies of previous apparatus approval documents and accompanying drawings may be considered satisfactory.
2. If the component is registered by Workcover for the same function, i.e. man lift box then design and item registration documents may be acceptable in lieu of certification and design calculations.

Where the powered winding system is subject to a functional safety approach, a Certified Functional Safety Expert (CFSE) shall undertake a complete review and provide a statement of compliance with AS61508, AS61511 or AS62061 as appropriate.

### 3.0 INSTALLATION

The installation and commissioning of the powered winding system must be carried out under the supervision of a qualified mechanical and electrical engineer.

An opportunity must be provided for witnessing of the commissioning process by engineering representatives of the Senior Inspector of Mechanical Engineering and Senior Inspector of Electrical Engineering of the Department of Primary Industries.

### 4.0 ASSESSMENT

#### 4.1 Mechanical assessment

The following documents (or documents containing the following information) must be provided with the design registration application for mechanical assessment:

- a) A detailed description of the powered winding system including:
  - (i) Purpose and description of use.
  - (ii) Designed, winding loads and speeds for both men and materials.
  - (iii) A functional specification on the controls of the powered winding system including all designed control, their limits and set points.
  - (iv) Identification of each component which constitutes the powered winding system.

- (v) Operational requirements
  - (vi) Any other information pertinent to the safe operation of the powered winding system.
- b) Representational drawings of the powered winding system including:
- (i) General arrangement drawings
  - (ii) Winding plant and conveyance drawings
  - (iii) Drawings or identification of the cable (rope) and associated attachments
  - (iv) All hydraulic and pneumatic control system drawings.
  - (v) Another drawing as required to clearly identify the powered winding system
- c) Appropriate documentation on the design of each safety critical component of the powered winding systems including, but not limited to: the winding plant; the cable (rope) and associated attachments; the winder control system(s); the conveyances, and the supporting structures.

The documentation must include design calculations, drawings and certification as described above.

- d) A requirement by requirement assessment of the winding system against MDG 33 by a qualified mechanical engineer.
- e) A risk assessment to verify the integrity of the winding plant under all operational and maintenance conditions, including the failure of components. (FMEA on the control circuit).
- Note: This risk assessment must be in a form which systematically analyses the failure of all components of the winding apparatus, e.g. Failure Modes Effect Analysis (FMEA), Fault Tree Analysis (FTA), Event Tree analysis (ETA), Quantitative Risk Assessment (QRA) etc.
- f) A design operational risk assessment on the use of the winding system in the mine. The risk assessment must include: commissioning, operation, examination and testing, maintenance, winch control, communication, competencies, training and emergency procedures.
- g) Details of the commissioning process.

Note:

1. This process will be required to be repeated every 5 years maximum.
2. Witnessing by DPI mechanical and electrical engineering officers is required.
3. Should include; static load testing of the conveyance and winding apparatus, static and dynamic brake testing, control function verification (limit switches).

- h) Additional documentation may be requested depending on the documentation submitted.

Note: Safety files to be kept and maintained on the powered winding system

#### 4.2 Electrical Assessment

All documents, as specified in MDG 2005:2003 must be provided with the design registration application for electrical assessment.



(CME3)

**NSW Coal Competence Board**

**EXAMINATION FOR CERTIFICATE OF COMPETENCE AS  
Mine Mechanical Engineer**

*(Coal Mine Health and Safety Act 2002)*

**Wednesday 21 August - 1.30pm to 3.30pm**

**Safety and Mining Legislation Applicable to Open-cut Coal Mines**

**INSTRUCTIONS TO CANDIDATES**

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**Part A Open book - Part B Closed book**

## **Legislation Section**

### **PART A - Open book format**

#### **Question 1 (Total 25 marks)**

##### ***Work Health & Safety Regulation 2011***

##### **Managing risk to health and safety - Part 3.1**

- a) Who has a duty to manage risks to health and safety at a work place? (5 marks)
- b) What must a duty holder do in regard to the management of risks? (5 marks)
- c) How can a duty holder control risks to health and safety if it is not reasonably practical for the risks to health and safety to be eliminated? (5 marks)
- d) What are the conditions for the maintenance of control measures that have been implemented? (5 marks)
- e) When is a duty holder required to review and revise necessary control measures? (5 marks)

#### **Question 2 (Total 25 marks)**

##### ***Work Health & Safety Regulation 2011***

With the introduction of the *Work Health & Safety Regulation 2011* you are reviewing your "**Part 4.3 Confined spaces**" management plan to ensure it reflects current requirements.

- a) For the purpose of managing risk to health and safety, what 5 relevant matters must a person conducting a business or undertaking have regard for? (5 marks)
- b) What information is required to be on a confined space permit? (5 marks)
- c) How would you determine the risk control measure for the confined space? (5 marks)
- d) What are the responsibilities for the duty holder (PCBU) at the completion of the works? (5 marks)
- e) How would a PCBU clearly identify a confined space to a worker? (5 marks)



**Question 3** (Total 25 marks)

**Coal Mine Health and Safety Regulation 2006**

**Isolation arrangements**

- a) What management plan is going to be used to control isolation arrangements at your operation? (5 marks)
- b) Give 5 examples of how you would control specific isolation arrangements at your operation. (5 marks)
- c) What is meant by group or gang isolation arrangements? (5 marks)
- d) What process would you use to ensure compliance with the operations isolation arrangements? (5 marks)
- e) List 5 energy sources which would require isolation. (5 marks)

**Part B - CLOSED BOOK**

**Question 4** (Total 25 marks – 2 <sup>1/2</sup> marks each part)

Multiple choice – please circle the correct answer

- a) Run type ladders are able to operate between:
  - i) 45 to 60 degrees
  - ii) 60 to 70 degrees
  - iii) 70 to 90 degrees
  - iv) None of the above
- b) Clear width of a walkway platform is:
  - i) 550mm
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  - i) Date of test
  - ii) Origin of rope manufacture
  - iii) Date of rope installation
  - iv) Test equipment used.
- d) The top rail of a walkway shall be at a vertical height of:
  - i) Not less than 500mm, not more than 1100mm
  - ii) Not less then 600mm, not more than 1100mm
  - iii) Not less than 750mm, not more than 1100mm
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- e) What minimum distance should gas fuel cylinders be stored away from fuel bays, fuel outlets and mobile equipment under repair?
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- f) The MDG for Fluid power systems safety at mines is:
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- g) All signs, labels and warning notices should be designed and installed in accordance with:
- i) AS 1318
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- h) Wire ropes may deteriorate due to some of the cumulative effects of the following:
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- j) Which of the following has the lowest ignition temperature?
- i) CH<sub>4</sub>
  - ii) Non Fire resistance polyurethane
  - iii) Diesel fuel
  - iv) 50 mm layer of high volatile NSW coal dust

**Question 5** (Total 25 marks)

A major shut down is due at your operation in 3 weeks. As part of this shut down you will be replacing the undercarriage of your large face shovel.

A service exchange undercarriage is being provided and installed by the original equipment manufacture (OEM). Some minor works will be undertaken by subcontractors during the shut down.

- a) Outline what preparation works would need to be done prior to commencement of the shut down. (5 marks)
- b) What are the specific hazards associated with this type of works? (5 marks)
- c) What risk control measures will you implement from the hazards identified? (5 marks)
- d) List any specialised equipment/personnel that would be required to complete the works. (5 marks)
- e) How do you intend on meeting your obligations under the legislation in the management of the works? (5 marks)

**Question 6** (Total 25 marks)

You are the Qualified Engineer at a surface operation which has a CHPP. The CHPP has a washed coal stock pile area for some 200,000 tonnes, a reclaim tunnel and conveyor system used to convey the product to a train load out facility.

- a) List 5 core hazards associated with the use of reclaim tunnels which incorporate a high speed conveyor. (5 marks)
- b) List the typical controls that apply to access into the reclaim tunnel for the purposes of maintenance and inspections (5 marks)
- c) List the monitoring equipment you would expect to find in the reclaim tunnel for both plant and environment. (5 marks)
- d) List the typical safety features you would expect to see on a push dozer operating on the stock pile. (5 marks)
- e) What reference material could assist you in the overall management of the stock pile and reclaim tunnel? (5 marks)

**Question 7** (Total 25 marks)

As the Qualified Engineer of a large surface operation you have received a phone call from the operator informing you of a structural failure on the head end of the stock pile discharge conveyor. The conveyor was commissioned back in 1996.

The jib assembly including the supporting structure has toppled forward coming to rest on the stock pipe with minimal damage to the structure. This conveyor is used to convey ROM product from an operating coal mine, as well as export product back to a rail loading facility

- a) Describe what your actions would be upon receiving the phone call. (5 marks)
- b) Describe in dot point form your short term plan to recover. (5 marks)
- c) What specialist would you intend on involving to advise you and why? (5 marks)
- d) What specialist equipment would you consider using and why? (5 marks)
- e) What would be your long term plan for management of this aged infrastructure? (5 marks)

**Question 8** (Total 25 marks)

As the Qualified Engineer for a large multi level CHPP, you have been asked by the operator to manage the major annual shut down. It is expected to have some 100 to 150 contractors on site in any one day.

The workscope includes but is not limited to:

- Chute replacement and retiling
- Screen and screen deck replacement
- Hot works on all levels of the plant
- Grit blasting and repainting
- Conveyor belt replacement and vulcanising
- Sump pump over hauls
- Electrical upgrades
- Major modification to the fines circuit

- a) What are 5 major hazards associated with this level of activity? (5 marks)
- b) What is your plan to manage the major hazards identified? (5 marks)
- c) How do you intend on supervising the works over the next 10 days on a 24 x 7 schedule with a limited number of supervisors? (5 marks)
- d) How are you going to manage non conformances to the operations Health and Safety Management Plan? (5 marks)
- e) On day 5 you receive a phone call advising that a welding operator has received an electric shock. How do you intend on dealing with this incident with the project now on critical path? (5 marks)

**END OF QUESTIONS**

**END OF PAPER**