

# EXAMINATION PAPER

## Mechanical engineer of coal mines other than underground mines certificate of competence

### CME3 – Safety and mining legislation applicable to surface coal mines

## Written examination held 8 August 2019

Issued under the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

### Instructions to candidates

Unless otherwise stated all references to the 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

10 minutes reading time is allowed prior to the start of the examination. Candidates can use a **highlighter only** to mark points of importance during the reading time but may not begin answering the questions. You must NOT use any other writing item during the reading time such as a pen.

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 workings in calculations. Consideration will be given in marking for **neatness in diagrams and hand writing**.

Provide answers in point form wherever appropriate. If you are unable to fit your answers in the available space use the three (3) blank pages included at the end of the paper. Ensure the question you are answering is clearly marked.

Electronic aids may not be used, apart from a non-programmable calculator.

**All six (6) questions are to be attempted.**

All questions are of equal value, but parts of questions may vary in value. The marks applicable to each part of a question will be indicated adjacent to the question.

This examination is a **closed book** examination – that is you cannot bring any reference material in to the exam, such as copies of legislation. Reference material will be provided in the exam paper as applicable.

Place your identification number only, NOT your name, at the start of this paper at the commencement of the exam – that is after the reading time is over.

## Question 1 – Mechanical Engineering Control Plan

**(Total 50 marks)**

**Part A** - As the statutory mechanical engineer of a coal operation you are preparing a Mechanical Engineering Control Plan (MECP)

1. What legislative clause requires a mine to have a MECP? (3 marks)
2. According to the legislative clause above when is a MECP required? (8 marks)
3. Who is responsible for ensuring the MECP is developed and reviewed? (3 marks)

**Part B** – Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 Schedule 2 (2)

1. What risks to health and safety associated with the mechanical aspects of plant and structures must have control measures set out in the MECP? (21 marks)
2. In Schedule 2 (2) (4) what matters must be specifically taken into account in respect of a belt conveyor? (15 marks)

## Question 2 - Work Health and Safety Regulations 2017

**(Total 50 marks)**

Chapter 4 Hazardous Work, Part 4.3 Confined Spaces

1. Work Health and Safety Regulation 2017, Chapter 1, Clause 5 states a “*confined space means an enclosed or partially enclosed space that: ...* “. What is included in the definition of a ‘Confined Space’? (12 marks)
2. What is specifically not included as a confined space? (4 marks)
3. The duty of designers, manufacturers, importers, suppliers, installers and constructors of plant or structures with regards to eliminating or minimising the risk relating to confined spaces is outlined in Clause 64. What must they ensure? (8 marks)

**Clause 66 Managing risks to health and safety**

*A person conducting a business or undertaking must manage, in accordance with Part 3.1, risks to health and safety associated with a confined space at a workplace including risks associated with entering, working in, on or in the vicinity of the confined space (including a risk of a person inadvertently entering the confined space).*

4. List the requirements that the PCBU must ensure under legislation, including specific controls, to assist in managing work in a confined space. (26 marks)

## Question 3 - Work Health and Safety (Mines and Petroleum Sites) Regulations 2014

(Total 50 marks)

Part 2 Managing Risks, Division 1 General requirements

1. **Clause 9 Management of risks to health and safety** outlines four (4) general steps required of the PCBU to manage risks health and safety at the mine site. Outline all four. (16 marks)

**(1) Clause 10 Review of control measures**

A person conducting a business or undertaking at a mine site must review and as necessary revise control measures implemented under clause 9 in the following circumstances:

2. What are the four (4) circumstances? (8 marks)

**Clause 10 Review of control measures**

*(2) The operator of a mine ... site must ensure that a control measure that is the subject of a request by ... is reviewed and as necessary revised.*

3. Under this clause who can request the review? (2 marks)

**Clause 14 Content of safety management system**

*(1) The safety management system document for a mine ... site must set out the following:*

4. There are twenty one (21) requirements identified in this clause? List twelve (12). (24 marks)

**PART B: Practical mining (3 questions – closed book)****Question 4****(50 marks)**

As the mechanical engineer of an underground coal operation you are also responsible for the coal handling plant. Earth moving equipment is planned to be utilised on both the raw and product stockpiles.

1. MDG28 Safety requirements for coal stockpiles and reclaim tunnels section 3.1.4 identifies six (6) risks of harm to the dozer driver that shall be considered. Identify four (4) of these risks: (12 marks)
2. MDG28 section 3.2.1 tables five (5) minimum recommended controls to be considered when a dozer is engulfed in the draw down point on the stockpile. Identify four (4) of these controls: (12 marks)

You are about to sign a contract with a local earthmoving company to take over managing coal movement on your ROM and product coal stockpiles. Both stockpiles are configured with aerial conveyor gantries and travelling trippers, as well as reclaim tunnels with coal valves.

You are reviewing your introduction to site process as part of managing the change to contractor supplied, operated and maintained equipment.

3. What documents do you want see as part of the equipment introduction process for the plant proposed by the Contractor? List five (5) (10 marks)
4. What specific checks on the machine would you ensure are included in the site introduction? (8 marks)
5. Describe what process you would implement to ensure the contractor equipment is maintained for its lifecycle on site. (8 marks)

## **Question 5**

**(50 marks)**

**(continued overpage)**

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# SAFETY BULLETIN

**DATE: MARCH 2019**

## Workers injured by high pressure fluid

This safety bulletin provides safety advice for the NSW mining industry.

### Issue

The risk of serious injury and potential death to maintenance workers being struck in the face and body by high pressure fluid releases has been highlighted in recent incidents reported to the NSW Resources Regulator.

### Circumstances

The incidents involved experienced contract maintenance workers undertaking a variety of tasks on hydraulic systems. High pressure fluid release was not an intended outcome of the task. The hierarchy of controls relied upon to control high pressure fluid release failed to prevent the maintenance workers from being struck and injured. The consequences caused serious and high potential injuries to workers.

*Figure 1: Shirt damaged by high pressure fluid release*



*Figure 2: Facial injury caused by high pressure fluid release*



The Resources Regulator released SB19-04 in March 2019 relating to workers injured by high pressure fluid. Your mine has just had a significant release of fluid pressure event that resulted in injury to a worker, but fortunately not an injection injury. You have decided to review your standard of engineering practice (SEP) for fluid power management.

1. NSW Code of practice: Mechanical engineering control plan section 4.5.9 identifies six (6) key issues associated with pressurised fluids. List four (4): (12 marks)
2. For each of the four (4) key issues identified above describe one (1) control you would implement in your SEP fluid power management (12 marks)
3. What process would you go through to review the SEP? (14 marks)
4. Who would you involve in the review? (12 marks)

## Question 6

(50 marks)

NSW Code of Practice: Mechanical engineering control plan

3.2.1 Energy sources associated with plant and structures

1. Section 3.2.1 identifies nine (9) energy sources as categories of energy hazards associated with mechanical aspects of plant, such as “radiation energy”. Identify five (5) other energy sources. (10 marks)
2. Using your experience, for each of the five (5) energy sources you nominated above identify:
  - a) an associated mechanism or scenario likely to occur in a coal mine,
  - b) the potential consequences to people in terms of health and safety,
  - c) a critical control you would implement to effectively mitigate the risk, and
  - d) a verification process you would implement to effectively manage each critical control. (40 marks)

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (August 2019). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the NSW Department of Planning, Industry and Environment or the user's independent advisor.

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