

Mechanical engineering manager of underground coal mines

March - October 2018

Post oral examination

Date: 22 March 2018

Number of candidates: 2

Number deemed competent: 1

General comments

Candidates were questioned on a range of topics including:

- hot work
- incident management as a result of a falling object in a CHPP
- diesel exhaust emissions
- earth moving tyres
- statutory function of the mechanical engineer

In general candidates performed satisfactorily where specific cause and effect answers were required. However, they did not perform as well on questions relating to the practical implementation of their knowledge or experiences.

Written examination

CME1 – Mechanical engineering practices applicable to underground coal mines

Summary of results and general comments

Exam date: 2 August 2018

Number of candidates: 5

Number who passed: 4

Highest mark: 72.95%

Average mark: 54.238%

Lowest mark: 49.35%

Examiner's comments

Generally, the majority of candidates demonstrated a good working knowledge of mechanical plant and infrastructure, and the management systems associated with its maintenance and operation.

Question 1 (total of 25 marks)

Highest mark 17.5

Average mark: 13.6

Lowest mark: 10

Examiner's comments

Dredges are being seen more frequently at mine sites, and the key risk issues are identified in the NSW code of practice: Mechanical engineering control plan section 4.5.8.5. The question focussed on the identification of hazards and the implementation of effective controls. Candidates appeared to find it challenging to logically assess plant not routinely used at site, that is, using experience to think outside the box.

Question 2 (total 25 marks)

Highest mark: 20

Average mark: 15.5

Lowest mark: 9.5

Examiner's comments

Fluid power systems involving high pressure hydraulics are a significant hazard at mine sites, and basic knowledge of how they function is essential in developing effective management systems for the protection of workers.

There was some polarity of candidates in answering the question. Either the candidates understood basic hydraulic systems and answered well, or they did not.

Question 3 (total 25 marks)

Highest mark: 18.27

Average mark: 17.06

Lowest mark: 14.41

Examiner's comments

Multiple choice question covering topics including:

- winder ropes
- diesel engine systems (DES)
- conveyors

Generally answered well by most of the candidates.

Question 4 (total 25 marks)

Highest mark:	20
Average mark:	17
Lowest mark:	11.75

Examiner's comments

The question related to the identification of hazards and controls associated with mobile plant and its introduction to the mine site. It was generally answered well by most of the candidates.

Question 5 (total 25 marks)

Highest mark:	18.5
Average mark:	14.6
Lowest mark:	9

Examiner's comments

Winders are a significant hazard at mine sites as any failure can potentially affect a large number of workers. Basic knowledge of how they function is essential in developing effective management systems for their maintenance and operation.

Again, there was some polarity of candidates in answering the question. Either the candidates understood basic winding systems and answered well, or they did not.

Question 6 (total 25 marks)

Highest mark:	18.5
Average mark:	17.10
Lowest mark:	15.5

Examiner's comments

The question related to the identification of hazards and controls associated with belt conveyors. It was generally answered well by all candidates.

CME2 – Legislation and standards applicable to underground coal mines

Summary of results and general comments

Exam date:	9 August 2018
Number of candidates:	8
Number who passed:	0
Highest mark:	48.5%
Average mark:	43.7%
Lowest mark:	37.5%

Examiner's comments

Generally, the results indicated a poor understanding of the practical application of legislation to mechanical hazards and controls. Even more significant was the lack of knowledge of the core elements of the role of the mechanical engineer and the implementation of the mechanical engineering control plan (MECP).

An independent review was carried out on the exam to ensure it was fair, equitable and relevant. The outcome indicated the questions should have been able to be answered by a well-prepared candidate, and the exam reflected the fundamental requirements of the role.

Reading and understanding questions remains an issue, even when specific legislation was referenced in the question.

Question 1 (total 25 marks)

Highest mark:	18
Average mark:	10.25
Lowest mark:	6.5

Examiner's comments

All but one candidate demonstrated a poor understanding of the practical application of legislation to the hazard of diesel exhaust emissions as it involves limits on gaseous emissions, registration and maintenance of plant, the effect of ventilation on exposure, and monitoring requirements.

Note that controls for diesel exhaust emission include:

- cleanliness of the engine – design, registration, baseline, maintenance
- effectiveness of post treatment – sampling, testing, monitoring
- ventilation quantity – inspections, tag boards, gaseous limits

Half of the candidates did not attempt, or received zero marks for, at least one section of this question.

Question 2 (total 25 marks)

Highest mark:	19.5
Average mark:	9.5
Lowest mark:	7.5

Examiner's comments

The first part required the candidate to use their practical experience at the mine to identify what systems the mechanical engineer has involvement in relating to the primary duty of care of workers. This starts with hazard identification and risk management, leading into the safety management system and MECP. It includes standards for purchasing, equipment, competency and introduction to site, right through to JSA, SWP, TBT, workplace inspections and housekeeping.

The second part required an understanding of how legislation is applied to the management of working at heights on site. This process begins with designing suitable walkways/stairs/ladders/platforms/etc to access areas requiring inspection and maintenance. Eliminating the hazard is at the core of lifecycle management. If this is impractical then it considers the management of alternate methods of temporary access.

Question 3 (total 25 marks)

Highest mark:	18
Average mark:	13.1
Lowest mark:	7.5

Examiner's comments

This question was answered best by candidates, with half the candidates scoring above 60% (15/25). However, every candidate received zero marks for at least one section of this question.

The question challenged the candidates practical understanding of the legislative obligations during incident and post incident management.

Question 4 (total 25 marks)

Highest mark:	16
Average mark:	10.81
Lowest mark:	4

Examiner's comments

This question was poorly answered considering it directly related to the role of the mechanical engineering manager and the content of the MECP, specifically what subordinate systems would the MEM develop to fulfil the legislative obligations of the MECP.

Oral examination

Date: 18 October 2018
Number of candidates: 2
Number deemed competent: 1

General comments

Candidates were questioned on a range of topics including:

- planning process
- incident management of head injury resulting from truck tailgate swinging shut
- confined space
- light vehicle brakes
- shaft winding system

In general candidates performed satisfactorily where specific equipment knowledge was required. However, they did not perform as well on questions relating to the practical implementation of their knowledge or experiences.

More information

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Acknowledgments

Manager of mechanical engineering of underground coal mines examination panel

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