Trade & Investment Mine Safety

EXAMINATION REPORT | CERTIFICATE OF COMPETENCE

Mine electrical engineer

16 February 2015

Examination panel report for exam held on 21 August 2014

Summary of results and general comments

Overall a disappointing result for industry and the candidates themselves. The examiners understand that candidates are working and studying for the examination at the same time. There have been a number of candidates completing three orals and having to sit the written examination again.

Generator installations are common at most mine sites, candidates are not demonstrating sound understanding or knowledge of these types of installations.

Earthing is key to ensure electrical engineering safety at mines, yet candidates are still struggling in their knowledge of this topic. The examiners would recommend that all candidates seek advice and help understanding which earthing method is suitable for which application.

The examiners will look at the syllabus with the view of updating it in 2015.

Following the recent oral assessments, examiners gave each candidate a face to face feedback session in early December 2014. Examiners provided advice to candidates on how they went and why the examiner found them not yet competent.

Looking forward to 2015, there will only be one written examination and two orals. The examiners will hold a briefing session in April 2015. See the department's website for details.

Written examination

Date:	21 August 2014
Total number examined:	10
New candidates	6
Candidates resitting:	4

Statistics

CEE1 Application of electrical engineering to mining	
Number of candidate examined	9
Number of candidates that passed	5
Paper CEE1 is marked out of	60
All questions are of equal value	10 marks
Minimum mark obtained	25
Maximum mark obtained	45
Average mark obtained	34
Pass mark	36 (60%)

Question	Minimum mark	Maximum mark	Average mark	Comments
1	1	7	3.5	Candidates failed to understand the necessary requirements with having an independent certifier and the documentation required to and from the department when requiring a design change on a mine winder.
2	4.5	9	6.5	This question was generally answered well. The main issues came from people not reading the question properly and not answering the question asked.
3	4.5	9	7	Most candidates provided an adequate answer to this question. Lightning study is the most important first step in understanding risk.
4	5.5	9	7.5	Requirements of WHS Reg should be considered core knowledge. In many cases candidates did not read the question properly.
5	3	10	6.5	There is still limited knowledge of cable design layouts and reasons for design. Generally answered well but there were several candidates who assumed it was written for a 3.3 kv cable which was not correct.
6	0.5	8.5	4	The candidates were not able to calculate the basic requirementes of fault level calculations and the differences and issues with an open and closed bus tie with what effect this will have on the system. The requirements for signs and labels as per Clause 19 and AS2067 were poorly understood.

CEE2 – Legislation and standards applicable to underground coal mines	
Number of candidate/s examined	9
Number of candidate/s that passed	5
Paper CEE2 is marked out of	120
All questions are of equal value	10 marks
Minimum mark obtained	49.5
Maximum mark obtained	87
Average mark obtained	69
Pass mark	72 (60%)

Question	Minimum mark	Maximum mark	Average mark	Comments
1	7	10	8.5	Generally well answered. Candidates are still not understanding their site management plans.
2	5.5	10	8	Candidates knowledge of Exe was positive with most showing good understanding of requirements. Responses to part c) of the question showed a lack of broad understanding.
3	0	7.5	3	Candidates knowledge of Section 17, 18 and 19 of the WHS Act 2011 is very poor. This is the keystone of WHS legislation.
4	4.5	10	7.5	Candidates had a average knowledge of mine process and how to proceed with an incident.
5	1.5	9	5	Candidates demonstrated little understanding of the impact of leakage current associated with variable speed drives.
6	0.5	6.5	5	Many candidates appeared to have a poor working knowledge of AS4371 content.
7	2	7.5	5	Candidates in many cases did not read the questions properly and had poor knowledge of AS 2290.1.
8	0	6	2.5	Candidates were not able to demonstrate the requirements of AS3007 in regards to powerline clearances and closed operating areas.
9	4	8.5	6	Results are surprising considering provisions in EEMP should be ‘core knowledge’ for candidates.
10	4.5	10	8	Risk management should be a core knowledge understanding but some candidates did not know the basics.
11	1.5	7	4	The candidates struggle with the specific requirements for welders as per the guidance in AS1674.2.
12	2	10	6	Candidates did not appear to have sound knowledge of Gazette notice 10, February 2008.

Oral examination

Date: 29 October 2014

Total number examined: 6

Passed: 1

Comments

Question 1 of the oral examination has been asked at the last two orals in one form or another yet candidates still find it difficult to establish how earthing will be achieved. Candidates should answer the questions assuming that they are the manager of electrical engineering and they are in the position to establish site standards.

The other questions, again, were similar to what been had asked before; looking at how candidates respond to issues facing managers of electrical engineering.

Oral question are based on events or issues managers of electrical engineering have or are currently facing.

All orals were opened with the examiners introducing themselves and the candidate giving a brief update of their role and what they had done since passing the written or failing the last oral. Any first time candidates were questioned on any aspect of the written that they had performed poorly in. All oral candidates were underground candidates.

Questions examined in the oral examinations

Underground

Question 1

Draw a single line diagram for a generator supply to two site sheds. The generator is a three phase 50KVA unit and the site sheds are to be supplied with 240V (Single line drawing with MEN configuration).

a) What are the minimum Australian Standards/Guidelines that you would apply to this installation?

Answer: AS3000, AS3001, AS3012, AS3010, AS3007, AS3008, AS2081 and EES-014.

b) What would be your earthing requirements for this installation?

Answer: No earth stakes - equipotential bonds required.

c) What are the names of the two earths involved in this installation as per AS3000?

Answer: Protective earth inside the cable and equipotential bond run separately.

d) What Earth leakage requirements would you want on this installation?

Answer: Main earth leakage circuit breaker fitted with maximum 500mA and final sub circuits fitted with maximum 30mA.

e) What commissioning requirements would you want from this installation?

Answer: AS3000, Section 8.

f) How would you expect the output voltage of the generator to be tested as part of the commissioning process?

Answer: No live testing permitted - isolate the generator and place test leads under the required terminals and stand away from the test points (min 500mm) or use remote head multimeters.

g) Where is this requirement driven from?

Answer: AS4836 and WH&S Legislation.

Question 2

A mine has been on “Care and Maintenance” for a period of time and is to reopen. You have been appointed as the manager of electrical engineering for the mine and you are employing a new electrical workforce for your operation.

Part of the initial needs will be to re-commission the High Voltage reticulation systems for the mine which has partially been lying dormant for a period of time.

Assuming that you have been through the interview and employment stages for your new electrical team members, the question then expanded to explore areas associated training, appointments, installations and permits with the management of HV. Examiners where looking for candidates to:

- Develop and/or review the High Voltage Management Plan for the mine,
- Training for tradesmen and Supervisors on the HVMP and HV Rules for your mine,
- Develop the "HV Permit to Work" for your system,
- Training and Authorisation of people,
- HV "Permit to Work" understanding,
- Authorisation to start a HV task – by who,
- Sufficient number of appointed HV personnel to manage the HV system, and
- SEP for installations

Question 3

You have recently obtained your certificate of competence and you are working for a company that operates several mines in your area. At a nearby mine the manager of electrical engineering (MEE) has taken sick and will be off for the next 3 months.

Your company has asked you to go to the mine and take on the role of MEE. The mine is in the final commissioning stages of a longwall move which is scheduled to start production in 4 days' time. You are up to date with mine site inductions and have worked there in the past.

- Explain to the examiners how you would go about fulfilling the role of MEE at this mine?
- The question expanded towards the longwall start and that major HV maintenance work was also scheduled for the next weekend. Examiners where looking for:
  - Who would you arrange to meet with and seek information from?
  - How would you quickly come up to speed with site standards of engineering practice?
  - How would you approach and get involved from the start and fulfilling the role of the MEE?
  - Whether you would take peoples reports as true and accurate or whether you would look for yourself and establish your own determinations,
  - How would you manage poor standards of installation when faced with them especially after other key mine personnel had given you a glowing picture of how things were progressing, and
  - How would you manage any conflicting priorities?
- What areas of concern would you, as manager of electrical engineering, have once commissioning was finished and the longwall started production?
  - The longwall going from a static position moving to full production with regards to power loading, voltage drop, protection settings, cable lengths and the physical aspect of the longwall moving etc.

Question 4

Candidates were asked a question combining knowledge of current and proposed mining legislation (CMHSA 2002; WHSA2011, WHSMR 2014) and Australian Standards applicable to management of explosion protected equipment in underground coal mines (AS/NZS3800 and AS/NZS2290.1). Candidates were also asked to consider a scenario where they discovered an item of Ex plant in service on their LW that had not been through the mine site introduction process.

- Candidates in general could state the responsibilities of the manager of electrical engineering under the CMHSA 2002
- Candidates in general could not state with confidence the content of s17; s18 and s19 of the WHSA 2011
- The majority of candidates advised they had not reviewed the draft Work Health and Safety (Mines) Regulation 2014, despite its availability. The content of the regulation was not an examinable part of the oral however, the examiners expect that candidates know what emerging issues are present in the industry.
- The majority of candidates could not explain in any detail the end-user obligations detailed in AS/NZS3800.
- In discussing requirements of AS/NZS2290.1:
  - no candidate considered IS equipment was included in a Pre-overhaul audit (when it is),
  - candidates all indicated that Pre-Overhaul Audits were a licensable activity (when it isn't),

  - most candidates confused the requirements of AS/NZS3800 and AS/NZS2290.1, and
  - most candidates did not understand the licencing function of the NSW Mining Regulator, and tried to link it with requirements contained in Australian Standards.
- All candidates dealt with the Longwall scenario in the anticipated manner; initially seeking further information and consequently the equipment being removed from service until it had been put through the correct process.

More information

Business Processes & Authorisations

Phone: 4931 6625

Acknowledgments

Steve Bentham, Inspector of Electrical Engineering and convenor of the Mine Electrical Engineer Examination Panel

PUB 14/330