Examination Panel Report
Mine Electrical Engineer Certificate of Competence
November 2013 (second round)

APPLICATIONS

Number applied: 18	**Number approved:** 16

WRITTEN EXAMINATION

Examination Papers: 3	
CEE1 - Application of electrical engineering to mining	
CEE2 - Legislation and Standards applicable to underground coal mines	
CEE3 Legislation and Standards applicable to surface coal mines	
Date/s:	21 August 2013
Number of candidates examined:	16
New candidates:	12
Candidates resitting:	4 - 2 of these candidates were resitting CEE1 and CEE2 and 2 of these candidates were resitting CEE2

Statistics

Underground candidates (papers CEE1)	
Number of candidates examined:	10
Number of candidates that passed:	6
Number of candidates with partial passes in from last round – passed CEE1 only	2 candidates previously passed CEE1

Underground candidates (paper CEE2)	
Number of candidates examined:	12
Number of candidates that passed:	4

Underground candidates (both papers)	
Number of candidates that passed both papers eligble to now sit the Oral examination:	4

Surface candidates (paper CEE3)	
Number of candidates examined:	4
Number of candidates that passed:	2
Number of candidates that passed eligible to now sit the oral examination:	2

Overall comments:

- Neatness is extremely variable – some candidates' papers were extremely difficult to read. Instructions posted on the front of the exam papers state; '*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 calculation. Neatness in diagrams is essential and will be considered in the allocation of marks'.*
- Candidates in many instances did not appear to read an entire question before answering.
- Working knowledge and understanding of the applicable sections of key Regulations and Standards (*CMHSR 2006; WHSR 2011;* AS/NZS3000; AS/NZS3007; AS2081; AS4240) in general needs to improve.
- Candidates continued to resort to padding answers with "motherhood statements" and technical information that was directly not relevant to the question asked.
- In many cases candidates in their answers did not appear able to articulate the practical application of Standards, Regulations and management systems to a mine site. In turn, this calls into question whether candidates undertaking exams have had sufficient exposure to the day-to-day application of such systems, or whether these systems are being rigorously applied at their places of work.

PAPER CEE1 statistics

Paper CEE1 is marked out of:	60
All questions are equal value marks:	10
Minimum mark obtained:	27
Maximum mark obtained:	48.5
Average mark obtained:	38 (63%)
Mark required to receive a pass:	36 (60%)

Question breakdown:

Question	Minimum mark	Maximum mark	Average mark	Comments
1	4	9.5	8.2	Candidates seemed to confuse the words "initial" and "long-term". May not have read the entire question before answering.
2	2.5	9.5	7.2	Several candidates did not appear to understand why it was important to try and constrain faults to low energy earth faults.
3	1	10	5.5	This question was answered poorly overall. Many candidates demonstrated only a high-level awareness of the issue. Most candidates resorted to "padding" of answers. Many resorted to paraphrasing the recommendations in the Safety Alert.
4	2	7.5	4.4	This question was answered poorly overall. The question specifically directed candidates to the content and requirements of AS2290.1. Each question was directed to a specific requirement identified in clauses within the Standard. Very few candidates appeared to have a working knowledge of this Standard.
5	4.5	9	7	This question was poorly answered, given that reproduction of a sectional diagram from AS/NZS1802 should be a straightforward exercise. Many candidates were unaware this cable design has a specific purpose (LW Shearer Cable).

6	1	10	6.2	This question has appeared in a previous exam, in a different scenario with altered parameters. Considering this, better results were expected. It was considered that in answering a question such as this, candidates would be able to estimate, based on practical experience, some broad value of expected motor size. This did not appear to be the case.

PAPER CEE2 statistics

Paper CEE2 is marked out of:	120 (100%)
Minimum mark obtained:	47.5
Maximum mark obtained:	83.5
Average mark obtained:	65.5 (54.5%)
Mark required to receive a pass:	72 (60%)

Question breakdown:

Question	Minimum mark	Maximun mark	Average mark	Comments
1	1.5	8	4.9	This question, considering the importance of the subject matter, was very poorly answered. Diagrams of "no-go" zones were poor. Working knowledge of AS4240 and standard site procedures appeared less than adequate in all cases.
2	5	10	8.3	This question was answered reasonably well by most candidates.
3	1	4.5	2.7	Question was answered very poorly. Candidates appeared to have no knowledge of requirements of WHS legislation and Standards with regard to electrical testing and live work, or the requirements of AS4836.
4	3.5	8.5	5.8	Many candidates failed to demonstrate a systematic approach to managing the scenario described in this question.
5	2.5	10	6.2	Many recent exams have contained a question on the requirements and content of AS2081 – with specific focus on items that would be relevant to an engineer at a mine site. Candidates continued to demonstrate poor or no working knowledge of this Standard.
6	0	6	2.9	Many candidates demonstrated poor technical understanding of overhead power-line characteristics (capacitance) by indicating they would undertake insulation testing.
7	1	10	6.8	Many candidates demonstrated a poor working knowledge of the requirements of the *WHSR 2011.*
8	4	10	7	Candidates in general demonstrated they had read the Code of Practice.
9	0	8.5	4.3	Some candidates appeared to not pay attention to the question – confusing "portable electrical equipment" with "portable electrical apparatus".
10	4	9	6.8	This was a straightforward question on increased safety equipment that anyone having completed EEHA training offered by any number of RTOs should have obtained full marks.
11	2.5	7	4.7	Induction processes at mine sites for contractors are well established. Candidates in many cases did not appear to be able to practically articulate the requirements for a system that should be in place at the mine site where they work.
12	1	8	4.8	Many recent exams have asked candidates to demonstrate a working knowledge of key requirements of AS/NZS60079.11 and Intrinsic Safety concepts. Candidates should be familiar with the structure and layout of IS Assessment block diagrams. This question was answered poorly overall.

PAPER CEE3 statistics (surface)

Paper CEE3 is marked out of:	120 (100%)
Minimum mark obtained:	42
Maximum mark obtained:	84
Average mark obtained:	64.8 (53%)
Mark required to receive a pass:	72 (60%)

Question breakdown:

Question	Minimum mark	Maximum mark	Average mark	Comments
1	5	9	6.8	Candidates demonstrated a very poor knowledge of the tests that would be applied to cable in accordance with the requirements of AS1747.
2	2	6.5	4.7	Candidates overall demonstrated a poor working knowledge of the specific requirements of applicable regulations and standards in consideration of electrical protection systems.
3	3	8	5.2	Candidates overall demonstrated poor knowledge of the requirements for the identification and classification of hazardous areas.
4	0	4	1.5	The approach of candidates to this question was poor. Under-pinning electrical engineering knowledge of candidates is a cause for concern, particularly given answers to part (5) of this question.
5	6	9	7.5	This question was answered appropriately by all candidates.
6	2	7	4.8	This question was answered poorly. Working knowledge of applicable Standards and engineering practices is less than acceptable. Most, if not all open cut mine sites would have installed demountable buildings at some time in the past three years.
7	2.5	9	5.8	Given the focus on electric shocks and welding in open cut mines in recent years, this question was answered very poorly. Some candidates demonstrated a poor knowledge of the applicable Standards.
8	3.5	10	6.1	Working knowledge of this code was barely adequate in some cases.
9	1.5	6.5	4.1	Candidates appeared to not understand this question. Working knowledge of electrical requirements for mobile plant appears to be very poor. This included the provision of even the most basic requirements such as E\Stops and dual-pole isolators.
10	4	9.5	6.6	Considering the Site Introduction Process is a fundamental safety management system at all mine sites, this question was, again, poorly answered. Candidates with a sound understanding of this process should have received full marks.
11	2	7	4.7	Induction processes at mine sites for contractors are well established. Candidates in many cases did not appear to be able to practically articulate the requirements for a system that should be in place at the mine site where they work.
12	5	9	6.6	This question was generally answered adequately. Candidates had great difficulty in explaining the difference between corona and partial discharge; and the types of gases released into the insulating oil during arcing within transformers.

ORAL EXAMINATION

Date/s:	22, 22 November 2013
Number of candidates:	17 (11UG + 6/S) eligible to sit exams
Number of candidates examined:	12 (7/UG +5/S) - 5 straight from written exam
Post orals examined:	7 (4/U + 3/S - of 11 eligible)
Passed:	3 (1 underground & 2 surface)

Overall comments:

- Candidates should not try and second guess the examiners' oral questions. The format is based on four questions asked on relevant industry topics. However, one examiner may ask two questions.
- Those candidates who were well prepared answered questions confidently and were able to verbalise logical thought processes as they worked through each scenario.
- One candidate brought a log book showing mines he had visited and questions he had asked. While not mandatory, the orals start with the question; 'What have you done since the written or last oral?' Examiners have been stating for some time that when candidates visit mines they should have a reason for visiting a particular operation, and a set of pre-determined questions to improve their understanding of the EEM role and gaps in technical knowledge, and not expect these visits will be a "silver bullet" to pass.
- In the world of business first impressions count. Candidates are presenting a future MEE or QEEs. Treat the oral examination as the first interview for the position.
- For underground candidates, knowledge of gas and explosion protected plant management is paramount. Candidates need to have a high level of knowledge in both these areas.
- Considering the widespread deployment of generator installations in mining, and the consequences of poor installation practices, applied engineering knowledge of generator installations and connected earthing systems overall remained poor.

Topic examined during orals

Note – Questions were based on events or issues Managers of Electrical Engineering have confronted recently.

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 the written exam or the last oral.

Underground

The mine at which you are the MEE is having a continuous miner overhauled, which has previously had two pre-overhaul inspections. The workshop had advised that there were several major Ex issues with enclosures fitted to the machine. The mine had bought two other machines at the same time in operation underground.

The examiners were looking for:

- appropriately establishing priorities in terms of managing risk to the mine (i.e, establishing the key risk is two potentially non-compliant machines in service underground and what actions could be taken to manage this).
- a systematic approach to managing the problem.
- potential solutions to managing the risk and solving the problem in both short and long-term.
- effective communication with different levels within the business, and external stakeholders.
- an understanding of how pre-overhaul inspections could be conducted and this problem could still occur.
- managing the potentially conflicting priorities of safety and production.

You are the MEE at a longwall mine that is process managed with a longwall, development and outbye services departments. You receive a phone call from the services superintendent that one of the fitters sustained an electric shock while changing a water pipe underground in an out district when the pipes were split.

The examiners were looking for:

- effective management of the electric shock victim.
- protecting other personnel from the hazard.
- knowledge of notification processes and non-disturbance requirements.
- knowledge of investigation processes and techniques
    - identifying the source of the shock
    - who would be involved in the investigation.
- technical understanding of hazards arising from induction and capacitive coupling.
- technical understanding of potential controls to manage the hazards.

Candidates were questioned on requirements of Gazette Notice #10, 2008 covering types of electrical plant used in a hazardous zone, and the requirements of fitting methane monitors to continuous miners.

The examiners were looking for:

- understanding of the requirements of the gazette notice.
- Recognised Certificates of Conformity for Ex plant in NSW mines
- maximum permissible methane levels specified within the gazette for Ex plant.
- who was responsible for positioning sensing heads on a continuous miner.
- who else could be involved.
- what the trip level would be on the continuous miner cutter head methane sensor.
- how this complied with the gazette notice requirements

Candidates were given a drawing of a fenced off area containing a 30kva generator, three site sheds, a poly water tank and two sea containers used for storage only. They were asked to run cables out and position distribution boards and the earthing requirements of the system.

The examiners were looking for:

- identification and working knowledge of applicable standards for the generator, site and installation.
- cable mechanical protection arrangements.
- preferred earthing system, and earthing requirements for the system.
- design of protection systems and settings.
- the earthing of the water tank, sea containers and fencing to manage touch potential.

Surface mines

Candidates were given a drawing of a fenced off area containing a 30kva generator, three site sheds, a poly water tank and two sea containers used for storage only. They were asked to run cables out and position distribution boards and the earthing requirements of the system

The examiners were looking for:

- identification and working knowledge of applicable standards for the generator, site and installation.
- cable mechanical protection arrangements.
- preferred earthing system, and earthing requirements for the system.
- design of protection systems and settings.
- the earthing of the water tank, sea containers and fencing to manage touch potential.

Candidates were asked to consider a scenario where an operator suffered an electric shock while handling a 22kv trailing cable supplying a dragline. The 66kv power to the mine also tripped about the same time the operator was reported as receiving the shock. The candidate was advised of the electric shock incident as they were proceeding to investigate the site power outage. On attending the incident scene it was obvious the cable was recently run over by a bulldozer.

Examiners were looking for:

- ability to rapidly assess a scenario and appropriately prioritise.
- management of electrical shock casualty.
- protecting other personnel at risk.
- effective communication to higher levels of management.
- understanding of HV installations; protection systems; and isolation practices.
- knowledge of notification processes and non-disturbance provisions.

You are the recently appointed QEE at an open cut operation. One of your initial observations when travelling around site is that a 132kV overhead power line appears to be very low across the haul road between the main pit and the truck dumping point.

Examiners were looking for:

- knowledge of clearance distances from the power lines.
- Knowledge of the definition of high voltage for overhead power lines.
- knowledge of key components in a Standard of engineering practice for overhead powerlines.
- the clearance the candidate would apply.
- how the situation would be managed where the clearance distances were found to be less than the SEP requirements.

What is the role of the QEE with respect to the *Coal Mines Health & Safety Regulation*?

The examiners were looking for:

- a sound knowledge and understanding of the role of QEE at a mine site as specified in the Regulations.
- what options were available to QEE to address ongoing compliance issues on the site with the operator.

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