Trade & Investment Mine Safety

DEPUTY CERTIFICATE OF COMPETENCE | FEBRUARY – MAY 2014

EXAMINATION PANEL REPORT

14 July 2014

Summary of results and general comments

Overall there was a reduction in successful candidates in the written exam compared to recent exams, but there was an increase in the pass rate for the oral exams.

Candidate numbers remain high. There is still a trend for a large number of candidates to decline to sit for the oral exam.

Written examination results

Date:	25 February 2014
Number of candidates:	108 (125 approved to sit)
Number who passed:	54 (50% success rate)
	(44 candidates passed from 89 candidates on 1st attempt = 49.5%)
Average overall mark:	57% (minimum pass mark 60%)
Highest mark obtained:	86/100

Question 1

Highest mark:	20/20
Average mark:	10/20

Question 1 required candidates to demonstrate their knowledge of legislation.

As discussed at the candidate briefing sessions, questions such as this are marked solely on reference to specific elements of the regulations. These do not have to be exact wording but must convey the meaning of the legislation. This area continues to be one of the weakest in the written exam.

Question 2

Highest mark:	18.5/20
Average mark:	9.5/20

Part (a)

For lift A the BLS should either be in a straight line across the heading or staggered from the left inbye to the right outbye (as per traditional systems).

For lift B the BLS should be staggered from right inbye to left inbye.

The BLS should be a maximum of 2m apart (shorter distance would be acceptable) and a maximum of half a BLS length (approx. 2.6m) apart lengthways.

Part (b)

Typical manner and sequence conditions for changes are that before any minor variations from the endorsed plan the Mine Manager shall ensure that:

i. such variations are approved in writing.
ii. a deputy cannot authorise variations
iii. the Manager, Deputy Manager, Undermanager-in-Charge or Undermanager may authorise a minor variation to the Manager's procedures. This can only be undertaken after the person authorising the variation personally inspects the site for the specific purpose
iv. a copy of the minor variations shall be posted on the surface and at the relevant Deputy's district board
v. the Mine Manager shall ensure that records are kept of all minor variations.

Major changes require consent from the Area Manager (i.e. senior inspector of coal mines)

Typically this is interpreted that deputies can leave coal (shorten lifts etc), the Undermanager can vary the lifting sequence and the Area Manager approval is required for major changes (change of footprint of extraction).

Question 3

Highest mark: 19/20

Average mark: 13/20

Many candidates did not appear to understand this question. The question required candidates to:

i. list the inspection regime for each task
ii. give reasons for frequency and timing of inspections
iii. list any instructions specific to the task that would be given to the workmen.

There were many acceptable ways of answering this question. Below are some the areas the examiners considered in marking this question.

Some basic elements:

Inspections have not been interrupted. Men can proceed to workplace before the deputy.

It is a production shift as there is an intention to produce, minimum five hourly inspections of areas where people work. No requirement for two hourly face inspections until cutting commences.

Two men building in TG – experienced at the mine, in the task, and known to the deputy. Hazards include strata, air contamination from goaf and manual handling. These men may go straight to the job. First inspection after all other jobs checked. If men have portable gas detection then minimal inspections required (other tasks are more high risk). If no gas detected then frequency should be based on history, knowledge and conditions of potential air contamination.

Two electricians on the shearer – at the crib room, check that the electrician understands his responsibility for the apprentice, and the knowledge/skill level of the apprentice. Check apprentice to determine any limits to his authorisations (work alone etc) and he understands he is to follow the instructions of the electrician. Men may proceed to task. First inspection will be after checking seal job and fitters. Two to three hourly inspections during shift, conducted at the same time as the inspections of the fitters.

Two fitters carrying out hydraulic maintenance – one experienced but the deputy is not familiar with him, the other is a contractor with limited experience in the area. At the crib room check that the mine fitter understands his responsibility for the contract fitter. Ask the fitter about the task and his proposed isolation method. Inform the mine fitter he is to carry out all isolation for both men (both men to lock/tag). Check contract fitter to determine any limits to his authorisations (work alone etc) and his SWMS and he understands he is to work under the instruction of the mine fitter. First inspection will be after checking seal job then two to three-hourly inspections.

Two miners building seal in MG – one with 13 months' experience in the task at the mine and the other 1 month's experience. The deputy is not familiar with them. Check men for their total experience and for any limits to their authorisations (work alone etc). Accompany men to the job site. Review the procedures (including their SWMS) to be used that day in detail. Observe their RA process (SLAM, Take 5, STAR, STOP etc). Ensure the experienced man understands his responsibility for the inexperienced man, and

the inexperienced man understands he is to work under the direction of the experienced man. Inspections every one to one-and-a-half hours.

Three men bolting – two experienced and one inexperienced. At crib room assign the graduate to one of the experienced men and ensure the experienced man understands his responsibilities and the graduate understands that he works under the directions of the experienced man. Send them to task with instructions that the two men are to go through the work procedures for the day in detail with the graduate prior to starting work and the graduate is only to observe until the deputy carries out his inspection of the area and assesses the graduates understanding of the task, the hazards and the controls. The three men are to be inspected after checking the seal job, fitters and electricians. Inspection frequency is two to three hourly.

Assumptions – Highest to lowest risk

i. Seal job – men not known, limited experience
ii. Fitters – men not known, one inexperienced
iii. Bolting – one man inexperienced, may be eager to get involved
iv. Electricians – apprentice on task
v. TG support – lowest risk job if supplied with gas detector.

Question 4

Highest mark: 20/20

Average mark: 11/20

Part (a)

Breathing atmosphere containing 3% CO2 – 100% increase in lung ventilation, panting on exertion, no disabling physiological effects. Possibility of slowed reactions, disorientation, impaired motor control, and diminished mental capacity.

Part (b)

Breathing atmosphere containing over 5% - toxic, depresses central nervous system, violent panting, exhaustion, and headache. Containing over 10% - severe headache and collapse; leading to death.

Part (c)

Illawarra bottom gas will be found on the floor if CO2 is over 46%. If CO2 is 46% or less it will migrate to the roof.

No marks were given for stating the mixture will separate and CO2 goes to the floor and CH4 will go to the roof. It was expected that candidates would recognise that Illawarra Bottom Gas is made up of CO2 and CH4 that make up 100% of the mixture.

Several candidates gave a good description and an estimate of neutral buoyancy of 50% based on 1.53 RD and 0.55 RD.

Part (d)

Increase in barometric pressure – seals will breathe in.

Decrease in barometric pressure – seals will breathe out.

If inspecting seals on a falling barometer there is an increased risk of atmospheric contamination in the area around the seals. The deputy must recognise this and modify his inspection to control the hazard. This should take into account the response time of his gas detector.

If inspecting seals on a rising barometer, the deputy must be aware that there is still a potential for contamination around the seal – how long has it been rising? How good is the seal? – He must not assume there air will be clear in the seal cut throughs.

If taking bag samples then the mine should have a procedure for when the sample is taken dependent on the barometer.

Part (e)

CO2 1.25%

CO 50ppm (30ppm for diesels, 30ppm TWA)

CH4 0.25 % start of hazardous zone

1% diesels in returns

1.25% electric power (1% alarm and 2% trip for face machines) (.5% for PEA)

2% withdrawal of men

2% in the hazardous zone

Question 5

Highest mark: 20/20

Average mark: 13.5/20

Part (a)

Generally well answered with the main issues being the explosion barriers and the hazardous zone.

Explosion barriers – advancing concentrated barrier - first barrier is 60 to 120m from inbye c/t, 2nd barrier no more than 240m from inbye c/t. Each barrier is approx. 40m long.

Fixed barrier – commences no more than 120m from inbye c/t and continues all the way out.

Advancing distributed barrier – 1st barrier begins 60 to 120m from inbye c/t. Fourth barrier begins no more than 120m from start of first barrier, other two barriers are spaced equally between the first and fourth barriers.

Hazardous zone – diagram or description must include the return

Part (b)

This question posed difficulties for many candidates. It is expected that deputies would be able to calculate air quantities in their panel.

i. Area 5.4 x 3.3 = 17.82

Less obstructions (0.7 x 0.35) + (0.5 x 0.45) + (Pi x 0.3 x 0.3) = 17.07

Average V = 1.325

Q = 22.6 m3/s

ii. Use an 18 m3/s fan to reduce possibility of recirculation. It was also acceptable to use the larger fan if it was stated that it would be required to be throttled back using the variable inlet vanes.

iii. B would have 1 to 3 m3/s

C would have 22.6 less the Q in B

D would have 5 to 7 m3/s at the tube length

E would have 22.6m3/s

Candidates should recognise that E = A

C = A – B

iv. Diesel power is 22.6/.06 = 376 kW

v. Velocity pressure or insufficient Q for the fan or poor location of the fan (too close to intersection)

vi. Stonedust from trickle duster, increasing heat and gas levels at face, pressure on outbye doors, and Q readings

vii. Straight vent line, rubbers on tubes, ensure the tubes are in good condition and close to the face, and there are no obstructions in stone trap

viii. 4.8 m3/s

Oral examination results

Dates:	13, 14 & 15 May 2014
Number of candidates:	115 (153 were eligible to sit)
Number who passed:	65 (56.5% success rate)

The reason for failure in the oral exam is still predominantly around ventilation understanding and emergency response.

Many candidates still do not possess the fundamental knowledge of pressure, quantity and resistance that would enable them to control the ventilation in a panel. This was demonstrated by candidates being unable to define the “open circuit capacity” of a fan and how the operating parameters change as tubes are added to the ventilation run.

Few candidates could define recirculation. Many gave a definition of “where used air is re-used”. This could apply to series ventilation systems and does not capture the main criteria of a fan being involved. A better definition would be “when air from the exhaust of a fan is drawn into the fan intake”.

Several candidates fail to adequately manage an emergency situation. They fail to prioritise the steps to be taken and often fail to demonstrate decision making and leadership.

Note:

Candidates are urged to consider sitting each attempt of the examination process, as statistically there is benefit from sitting in close succession, with the pass rate increasing with each attempt.

For those candidates found NYC, the Oral examination process in itself, and the feedback drawn from it, identifies the skills gaps, targets areas for each candidate to study further, and engage in training to consolidate their knowledge and skills.

More information

Business Processes & Authorisations

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Acknowledgments

Deputy Examination Panel