Trade & Investment Mine Safety

EXAMINATION REPORT | CERTIFICATE OF COMPETENCE

DEPUTY

16 February 2015

Panel report for examination held on 5 September 2014

Summary of results and general comments

Written examination results

Date:	5 September 2014
Number of candidates:	74 (94 approved to sit)
Number who passed:	29 (39.2% success rate)
	(19 candidates passed from 36 candidates on 1st attempt = 52.8%)
Average overall mark:	54.5% (minimum pass mark 60%)
Highest mark obtained:	84.5/100

Question 1

Highest mark:	20/20
Average mark:	9.1/20

Question 1 a)

Ventilation arrangements for an underground mine must provide for the following:

(a) the design, monitoring and control of the underground ventilation arrangements (including design, monitoring and control required to support gas management, spontaneous combustion management or other hazard management arrangements at the mine that are dependent on ventilation)

(b) the supply to all accessible parts of the mine of sufficient ventilation:

(i) to provide air that contains by volume not more than 0.005 per cent carbon monoxide and not more than 1.25 per cent carbon dioxide, and

(ii) to render harmless any flammable gases or other atmospheric contaminant, to the degree required to conform with the regulations made under the *Occupational Health and Safety Act 2000*

(c) the maintenance of the methane concentration in the general body of air:

(i) at not more than 0.25 per cent by volume in an intake airway at the start of a hazardous zone, and

(ii) at not more than 2 per cent by volume in a hazardous zone

(d) the action to be taken if the limits referred to in paragraphs (b) and (c) are found, or reasonably suspected, to be exceeded at a place at the mine

(e) the maintenance of return airways in a condition so that they are accessible to those who must inspect them or travel through them in an emergency

(f) the control of ventilation

(g) reporting procedures relating to ventilation

(h) the maintenance of ventilation records and plans

(i) the manner of sealing of parts of the mine and the precautions to be taken in sealing parts of the mine

(j) audits of the operation of the arrangements and for periodic reviews (at intervals not exceeding 2 years) of the effectiveness of the arrangements

(k) any matters required to put into effect the provisions of Division 3 of Part 4.

Overall comment: Candidates still struggle with the legislation component of the exam.

Question 1 b)

In the *Work Health and Safety Act 2011*, reasonably practicable, in relation to a duty to ensure health and safety, means that which is, or was at a particular time, reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters including:

(a) the likelihood of the hazard or the risk concerned occurring, and

(b) the degree of harm that might result from the hazard or the risk, and

(c) what the person concerned knows, or ought reasonably to know, about:

(i) the hazard or the risk, and

(ii) ways of eliminating or minimising the risk, and

(d) the availability and suitability of ways to eliminate or minimise the risk, and

(e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

Overall comment: Candidates generally did well on this section.

Question 2

Highest mark: 19/20

Average mark: 12.3/20

Question 2 a)

A chemical oxygen self-rescuer works by delivering oxygen and removing carbon dioxide from the exhaled breath. The SCSR provides oxygen from potassium superoxide; the reaction is activated by the exhaled air of the user. The major components are:

- breathing bag
- nose clamp
- mouthpiece
- heat exchanger
- quick start (on some models).

Overall comment: Several candidates could not demonstrate an understanding of the self-rescuer.

Question 2 b)

The description of the event points to some members of the crew using more oxygen than is being delivered by the SCSR. The first action is to stop and wait for the breathing bags to re-inflate. When re-commencing the escape set off at a slower pace than before to reduce the oxygen demand of the crew.

Overall comment: This is an important failure mode of SCSR for deputies (and all workmen) to understand. By understanding how SCSRs work and fail a deputy can take appropriate actions to secure the safety of their crew. It was not appropriate to speed up the rate of escape or leave men behind in this situation.

Question 2 c)

It is important to note that in such incidents it is often possible to have more than one activity occurring at a time by the appropriate delegation of tasks to crew members.

Priorities are:

- Make sure the area is safe.
- Immediate treatment of the injured person.
- Inform surface of the incident and request an ambulance – also request any other assistance required (such as cage to pit bottom and inform control that a Cl 55 incident has occurred) at this time.
- Stabilise the injured person and prepare for transport
- Organise transport – there is a requirement for a first aid trained person to accompany the injured person. Assess the number of persons required to accompany the injured person. There may only be the need for one plus the driver in this case – there has been no impact on consciousness and no head injury.
- Determine what first aid equipment, pain relief to send with the person.
- Determine if the area is safe – does it need a pump set up etc – and take appropriate action.
- Isolate the area – even though there is no confirmation of a fracture it is to be treated as a Cl 55 (a) (ii) incident as there is a reasonable belief that a fracture has occurred.
- Note any changes to the area that occurred during the treatment and recovery of the injured person.
- Gather witness statements.
- Organise for replenishment of first aid equipment.
- Any investigation activities will be limited as physical examination of the incident area is restricted until the inspector of coal mines and the industry check inspector have been informed and released the site.

Overall comment: This question asked for the actions to be prioritised. Several candidates did not put the care of the injured person as the main priority.

Question 3

Highest mark: 19.5/20

Average mark: 13/20

Question 3 a)

CO make is a measurement of the production of pure carbon monoxide in litres per minute. It is calculated from the concentration of CO and the ventilation quantity that it is present in. It is used as it is not disguised by high air flows and it is not changed by nitrogen injection. It cannot be used for samples from sealed areas as it requires a ventilation flow for it to be calculated.

Overall comment: Most candidates could explain CO make, many did not understand why it is used.

Question 3 b)

Inspect all equipment, ensure the sample bag is empty, the sample pump or aspirator bulb is working and you have appropriate labels. The sample point should be flushed using the pump to ensure that the point will deliver a sample representative of the atmosphere from behind the seal.

The sample bag is to be filled and emptied twice from the sample point, only fill the bag to approximately two thirds capacity. Fill the bag a third time to the same two thirds capacity. Securely seal the bag.

The label should be filled in noting:

- the place where the sample was taken
- the date
- the time it was taken
- barometric pressure at the time of the sample
- whether the sample point was sucking in or blowing out.

- Name of the person taking the sample.

Overall comment: Very few candidates considered checking the equipment and flushing the sample line.

Question 3 c)

(i) Open circuit capacity of a fan is the amount of air a fan can draw when it is not connected to any restrictions e.g. tubes etc. It is the maximum the fan can draw under any circumstances and will only decrease as tubes are added.

(ii) Recirculation is where air from the exhaust of the fan is drawn into the intake of the fan. It may be caused by incorrect positioning of the fan, insufficient airflow in the panel or by velocity pressure from the exhaust of the fan.

Overall comment: Several candidates had difficulty in clearly expressing the meaning of “Open Circuit capacity” and “recirculation”.

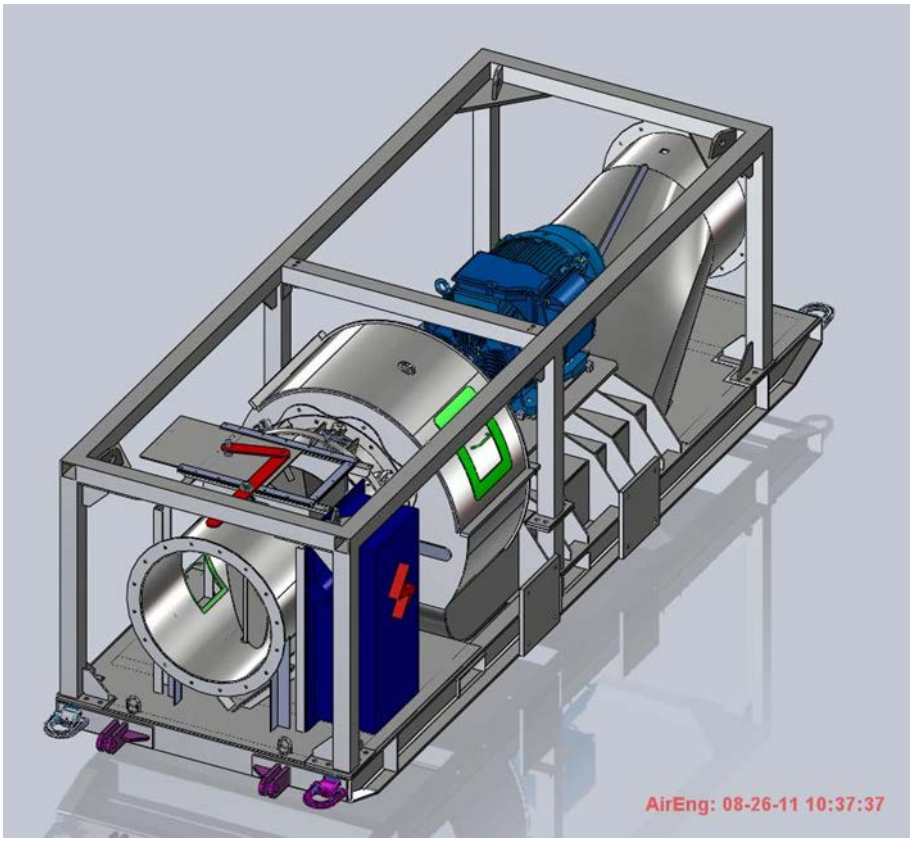
Question 3 d)

The correct location of stone trap, degassing box and VIVs is on the intake side of the fan.

Direction of airflow should be provided

- electrical enclosure
- impellor (centrifugal)
- motor.

Overall comment: Some candidates did not correctly locate the degassing box or VIVs on the intake side of the fan.



Question 4

Highest mark: 18/20

Average mark: 11.4/20

Question 4 a)

Ventilation:

- brattice wing on intake side of stub
- show direction of airflow in roadway
- venturi
- if electrical cable shown, cable should preferably extend to the drill rig from the intake side.

Environmental monitoring:

- gas monitoring to be on the return side of the hole being drilled (at roof level)
- additional hand held monitor to inspect around drill rig, stuffing box and spar bath.

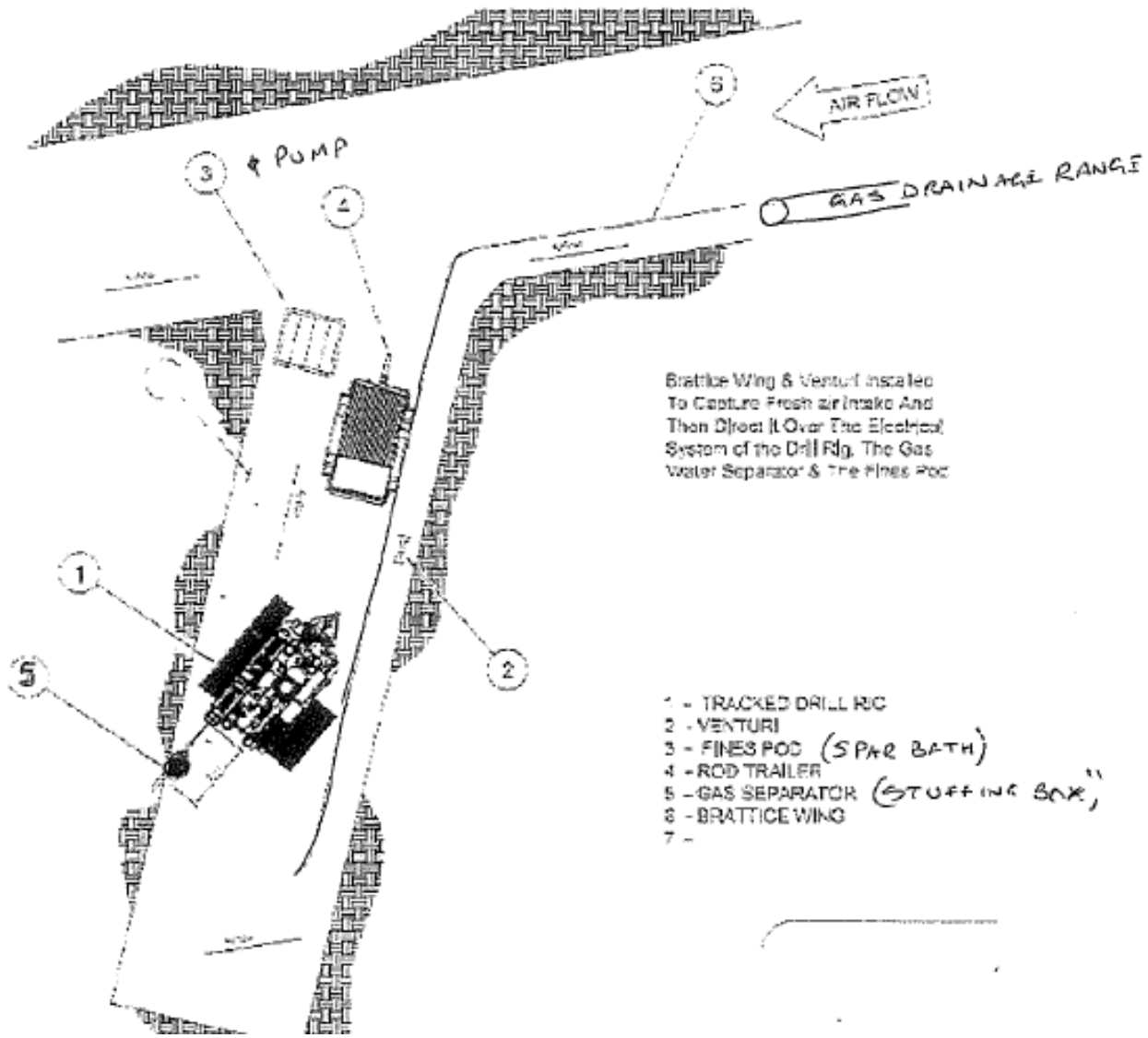
Gas control measure:

- stuffing box (gas separator)
- suction lines from stuffing box to main gas range (install level to prevent build-up of water)
- suction line to spar bath (fines pod).

Water control measures:

- pump,
- spar bath (fines pod),
- water hose from stuffing box to spar bath.

Overall comment: Many candidates had inadequate ventilation for the stub. Generally there was little consideration of where to place gas monitoring equipment. It needs to be placed in the best position to pick up any gas in the stub and this must take into account the air flow in the stub.



Question 4 b)

Inspection of the environment:

- Test for gas in drill stub at roof and general body.
- At stuffing box (gas separator) on hole being drilled.
- At the spar bath or fine pod.
- Check that ventilation is adequate, brattice wing installed to standard and venturi operating.

Check suction is available at end of main range, suction available to stuffing box on hole being drilled, suction available to spar bath (fines pod). Check that suction holes are installed flat (level) to prevent build-up of water that would cause blockage and/or reduce suction.

Inspect for general standards of worksite and that water make from drilling is being managed. Check understanding of operators to required drilling procedures and risks.

Inspect drillers log to understand if drilling in normal conditions, increased gas make, boggy or structured ground, etc.

Overall comment: Most candidates listed the generic inspections and did not consider the inspections that would be required for this specific area.

Question 5

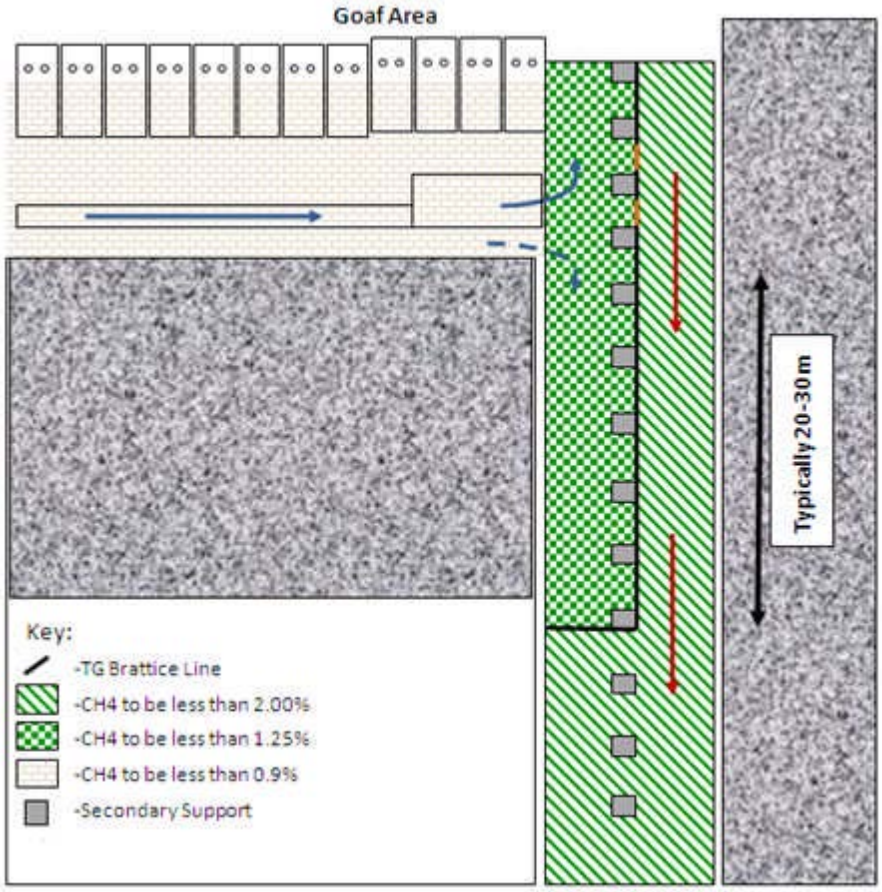
Highest mark: 19/20

Average mark: 8.7/20

Question 5 a)

During normal production the brattice screen is to be at least level with the legs of the tailgate shield, but not past the flushing shield. The brattice line should be extended at least 10m in advance of the face (roadway conditions permitting). Up to two window holes (approx. 1m x 1m) are permitted to be cut in the upper section of the screen.

Overall comment: This was either well answered or very poorly answered. It is a common technique that should be well understood by deputy candidates.



Question 5 b)

Key dimensions:

- Installed so that the brattice will not be cut down by the shearer as it cuts into and out of the TG.
- Inbye end of the brattice wing to be level with the legs of the TG support.
- Length of brattice wing extending outbye of the face sufficient for 24 hours production.

Effect of varying length:

- Extended too far into the goaf then will draw more gas out of goaf giving high gas readings behind the brattice and in the TG.
- Not extended to TG legs then there is the opportunity for goaf gases to pass over the TG drive and associated electrical equipment.

Overall comment: Several candidates neglected to discuss the effect of varying the key dimensions.

Question 5 c)

- Maintain inbye end of brattice wing adjacent to the legs last TG support.
- Cut hole in the brattice wing adjacent to the legs of the TG support as it retreats between each 3m support holding the TG brattice.
- Conduct gas readings behind the TG brattice to ensure that goaf gases are being diluted to within statutory levels.

- Ensure the brattice wing is of sufficient length outbye for the planned production shift.
- Inspect and ensure the brattice wing is intact along it length to prevent ventilation short circuiting along the block side of the brattice.
- Ensure standing support to which the TG brattice wing attached is installed in the correct location, such that TG brattice will not be cut down by the shearer drums.
- Manage LW face creep. Excessive creep to the TG can result in the shearer cutting out TG brattice (and standing support).

Overall comment: Several candidates gave a generic inspection list and did not consider the actions specific to the situation.

Question 5 d)

The wing may be installed at mines with a spontaneous combustion issue, where flows through the goaf draw excessive gases into the tailgate or where the goaf is standing back in the maingate providing a ventilation path behind the supports reducing the airflow onto the face.

Brattice screen (wing) installed between the rib line and the first MG support. Brattice would need to be advanced along the rib after each advance of the maingate supports.

Overall comment: Many candidates did not discuss when such a wing would be used.

Oral examination results

Dates:	11 & 12 November 2014
Number of candidates:	56 (92 were eligible to sit)
Number who passed:	25 (44.5% success rate)

Comments:

The main areas where candidates were found to be ‘not yet competent’ were ventilation and emergency management. These are two of the most basic areas for a candidate to demonstrate competence to be eligible for the awarding of a certificate of competence to be a deputy. Sixteen of the 31 candidates who did not meet the competency requirements were assessed as not yet competent in emergency management and 26 of the candidates were assessed as not yet competent in some aspect of ventilation (LW ventilation, development ventilation, degassing, gases, brattice ventilation or auxiliary fan ventilation).

It is of concern to the examiners that 24 of the 31 candidates assessed as not yet competent were found to be not yet competent in 3 or more topic areas.

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 ‘not yet competent’, 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

PUB14/290