



Mapping Exercise

Ventilation Measurer

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Introductions

This document has been produced to examine how statements within the National Occupational Standards (NOS) can be used to develop the content that could form a common training standard for Ventilation Engineers across the UK mining sector. The following standards have been considered as part of developing this approach.

Module Title	Original NOS Reference	UK Standards Reference
Carry Out Mine Ventilation Measurement		MPQVG03
Oversee Mine Ventilation Monitoring		MPQVG04
Evaluate Mine Ventilation Methods		PROMM18
Design Mine Auxiliary Ventilation Systems		MPQVG05
Design and Maintain Mine Ventilation Standards		MPQVG13

The tables contained within this document have aimed to:

1. Use the knowledge statements from the NOS to inform a wider content for any training programme.
2. Use the performance statements to start to inform a structured approach to assessment.

Disclaimer

The **Mining Qualification Committee** (MQC) has developed and reviewed the training and assessment material.

MPQC have provided the accreditation for the training and assessment material.

MAUK have published the training and assessment material and provided access for the underground mining sector.

It remains the responsibility of the **mine operator** to verify the training and assessment material is suitable for their circumstances and application.

Pre-Entry Qualification

MPQVG01 (MT17) – Operate Safely in the Mine Environment

This module can be satisfied by the common induction module (working safely and efficiently in the underground environment).

MPQVG02 (MT18) – Conform to Efficient Work Practices

This module can be satisfied by the common induction module (working safely and efficiently in the underground environment).

Potential Qualifications

The National Occupational Standards identified on page three of this document cover two main areas:

1. The operation and measurement of a mine ventilation system.
2. The design of mine ventilation systems.

It is therefore proposed that the mapping exercise be used to produce two separate qualifications for the mines:

1. Ventilation Observer/ Measurer.
2. Ventilation Engineer.

Portfolio Area	Ventilation Measurer	Ventilation Engineer
MG1	✓	✓
MG2	✓	✓
Legislation (general)		✓
Legislation (ventilation)	✓	✓
Risk management	✓	✓
Mine emergency response	✓	✓
Measuring mine ventilation	✓	✓
Recording results	✓	✓
Mine gasses	✓	✓
Mine dusts (and other airborne hazards)	✓	✓
Heat and humidity	✓	✓
Designing ventilation systems		✓
Installing and commissioning ventilation systems	✓	✓
Planning and making changes to a ventilation system		✓
Using ventilation modelling and simulation		✓
Mine planning process		✓

Mapping Exercise

MPQVG03 – Carry Out Mine Ventilation Measurement

MPQVG03 – Carry Out Mine Ventilation Measurement		
Knowledge Statement		Elements
K1	The hazards and risks associated with the occupational area and work activity.	See MPQVG01 – Operate Safely in the Mine Environment.
		See MPQVG02 – Conform to Efficient Work Practices.
K2	The purpose of mine ventilation measurements, calculations, and sampling.	Describe why mines install systems of ventilation, and what it is designed to control.
		Outline the various types of mine ventilations systems that may be used.
		Outline why mines carry out ventilation measurements, calculations, and sampling of those ventilation systems.
K3	The regulatory and organisational requirements for environmental testing.	Understands the Mines Regulations 2014, (Regulation 14) and the importance of inspections in relation to early warning of major hazard events.
		Can define how the organisation complies with the principles outlines by Regulation 14 of the Mines Regulations.
		Understands the Mines Regulations 2014, (Regulation 21) in relation to the presence of explosive atmospheres.
		Can define (if applicable) how the organisation has carried out an assessment and classified areas below ground as hazardous and non-hazardous.
		Understands the principles of zoning as defined by the Dangerous Substances and Explosive Atmosphere Regulations.
		Can define how your organisation (if applicable) controls potential ignition sources, where the concentration of flammable gas may exceed 25% by volume of the lower explosive limit.
		Outline the requirements under Regulation 26 of the Mines Regulations 2014 of the actions to be taken to reduce the risk of explosions in coal mines.
		If Applicable to your organisations, define the actions that the organisation takes to comply with Regulation 26 of the Mines Regulations 2014.

		Outline the key requirements of Regulation 43 of the Mines Regulations 2014.
		Define the procedures that your organisation must: • Ensure that there is suitable ventilation in the mine. • How the ventilation system is monitored. • How the information is recorded on a plan. • The measurements that are taken to verify that they oxygen levels remain above the statutory limits. • The limits that are set in relation to temperature and humidity below ground, and any limitations that are imposed.
		From the Control of Substances Hazardous to Health, define the occupational limits when considering respirable crystalline silica.
		Define how your organisation monitors exposure to respirable crystalline silica, and the hierarchy of actions that must be taken if the organisational limits are exceeded.
		Define what EH40 defines in relation to operational exposure limits for various gasses that may be found underground.
		Outline how your organisation monitors the environment and the individual to ensure the occupational exposure limits are not exceeded.
		Outline the organisational procedures to be followed should the occupational exposure limits be exceeded.
		Outline the requirements for the control of diesel engine exhaust emissions in the workplace under HSG187.
		Define how your organisation monitors exposure to DEEE's.
		Define how your organisation controls and minimises exposure to DEEE's.
K4	The constituent gasses in a normal atmosphere and their relative proportions.	Can define how the normal atmosphere at the surface is made up
		Can define the relative proportions of each of the main gasses that make up the mine atmosphere.
K5	The gasses that can be found in mines.	Outline the typical gasses that can be found in mines.
		Define how the atmospheric pressure (barometric pressure) may affect the gasses that are present in the mine.

		Outline the gasses that are present in your mine.
		Outline the operational limits for the presence of mine gasses within your organisation.
K6	The hazards and risks arising from mine gasses.	For the gasses identified in K5 , define: 1. The physiological effects at various quantities on persons that may be exposed. 2. The hazards that may be introduced into the mine environment due to the presence of those gasses
K7	The acceptable and unacceptable levels of the composition of the atmosphere in mines.	See K5 and K6 above.
K8	The problems that can adversely affect mine ventilation.	Outline the issues that may cause a disruption to the various mine ventilation systems (should consider the main and auxiliary ventilation system installed at a mine).
K9	How to select and check mine ventilation and atmospheric measuring and sampling equipment.	Define the methods used at your mine to check mine airflow readings.
		Outline how the instruments that are used to check mine airflow readings is checked for calibration and accuracy prior to taking the readings.
		Define the method for taking gas samples from the general mine environment.
		Outline how the instruments that are used to check general mine environment readings is checked for calibration and accuracy prior to taking the readings/ samples.
		Define how the barometric pressure readings are taken and recorded at your mine.
		Define the methods used at your mine to check pressure drops in mine roadways and ventilation ducting's.
		Outline how the instruments that are used to check pressure drops in roadways/ ventilation ducting's are checked for calibration and accuracy prior to taking the readings/ samples.
K10	Actions to be taken when measuring or sampling equipment is not working correctly or is damaged.	Actions to be taken if any test or sampling equipment is found to be defective or out of calibration.

K11	The layout of the mine, including ventilation pathways and sampling points.	Outline how your mine is laid out, and the impact that this has on the route that the ventilation takes. Define how sampling points are positioned to ensure that all the critical areas are sampled. Define how the individual sample points are identified on the plan, and how the information taken from each of those sample points is recorded. Look at other mine layouts and define how these vary from your own; and how and why you would position monitoring points for that layout.
K12	The types of equipment used in auxiliary ventilation systems.	Identify the main types of fans that make up an auxiliary ventilation system. Identify the key components within a forcing ventilation system. Identify how the pressure and quantity may be regulated on a force ventilation system and why this may be important. Identify the key components within an exhaust only ventilation system. Describe how the components may be combined to produce a force/ exhaust overlap system. Describe the arrangement that may be provided if there could be a need to degas a heading if the auxiliary ventilation system is stopped. Outline the type of equipment that may be installed on an auxiliary fan to monitor the 'health' of the fan and give early indication of failure. Outline the equipment that is provided to control airborne dust entering or exiting an auxiliary ventilation system.
K13	How to complete mine ventilation related calculations .	For measurement and calculation of pressure define or provide: • The relationship between pressure and head of fluid. • Measurement/ calculation of static pressure/ velocity pressure and total pressure. • Pressure required to impart velocity to air. • Atkinsons equation. • Variation of pressure with cross sectional area.

		For measurement and calculation of airflow define or provide: • Airway quantity flow. • Airflow splits. • The use of regulators to influence airflow splits. • Define Leakage. • Define Recirculation. • Calculate Recirculation.
		For measurement and calculation of resistance define or provide: • The resistance of a single roadway. • The resistance of roadways in a parallel.
		For determination/ calculation of the psychrometric properties of Air: • Density of Humid Air. • Relative Humidity. • Apparent Specific Humidity (also called Moisture Content).
K14	The acceptable range of results arising from measurements and calculations .	For the items defined in K13 , provide the organisations acceptable tolerances when measuring or calculating mine ventilation results.
K15	The consequences of accurate and inaccurate measurements , calculations , recording, or sampling.	Outline the importance of accuracy when carrying out ventilation readings or calculations.
		Define the implications if the measurement and calculations are inaccurate.
K16	How to record and report results.	Outline how your organisation records the results of any measurements and calculations.
		Outline where the information is stored and for how long.
		Within your organisation define, the frequency of sampling and monitoring, and what, if anything, may vary the frequency of any sampling or monitoring.
K17	Actions to be taken if results are outside the acceptable range.	Outline what would be required by your organisational procedures, should the results of any sampling or testing fall outside of the acceptable ranges.
K18	The approved policies, procedures and practices related to the work activity.	See K9, K10, K13, K14, K16 , and K17 above.

MPQVG04 – Oversee Mine Ventilation Monitoring

MPQVG04 – Oversee Mine Ventilation Monitoring		
Knowledge Statement		Elements
K1	The constituent gases and their proportions in a normal atmosphere.	See K4 of MPQVG03 – Carry Out Mine Ventilation Measurement
K2	The laws relating to gasses.	Define the principle of Boyles Law and how it is applied to mine ventilation.
		Define the principles of Charles Law and how it is applied to mine ventilation.
		Define the principles of the combined gas law and how it applies to mine ventilation.
		Outline the principle of Bernoulli's Theorem and how it applies to mine ventilation.
K3	The gasses that can be found in mines.	See K5 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K4	The hazards and risks arising from mine gasses.	See K5 and K6 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K5	Acceptable and unacceptable levels of composition of the atmosphere in mines.	See K3 , K5 , K6 and K7 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K6	The problems that can adversely affect mine ventilation.	See K8 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K7	Geological features that could affect mine ventilation.	Define how the following may impact ventilation in the mine: - Partial closure of a roadway through ground movement. - Total closure of a roadway through a fall of ground. - The dimension of a roadway be larger than the planned extraction. - Sharp turns within a roadway to avoid geological features.
K8	The effects of water on mine ventilation.	Define how a swilly and a build-up of mine water may impact the mine ventilation, in the short and long term if left unremedied.
	The effects of abandoned workings on mine ventilation.	Define how the mine may be impacted by abandoned workings if they are not correctly sealed, should consider:

		• Loss of airflow (split) • Leakage of mine gasses from old workings.
		Outline the impact that the barometer may have on old workings if flammable noxious or toxic gas is present.
		Outline the impact that ventilation changes may have on old workings.
K10	Mine ventilation systems and equipment.	See K5 and K6 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		Define the key components in a surface/ underground mine fan, that is being used to exhaust air from the mine.
		Define the key components in a surface/ underground mine fan, that is being used to force air into the mine.
		Define what an air door is used for when positioned in a mine ventilation system.
		Define what a regulator is used for when positioned in a mine ventilation system.
		Outline when you would install a booster fan in a mine, and the purpose of installing that fan.
		Define what a ventilation stopping is and the different types and when they are installed.
		Define what a balance chamber is and when they are used. [This may not be used in some mines within the UK when sealing old areas of the mine.]
		Explain what a hurdle may be installed for in a mine, and how they may deal with layering or emissions at roof levels in a mine.
		Define how gas emissions at floor level may be dealt with, and the techniques that may be used to deal with these types of emissions.
K11	Mine ventilation measuring and sampling equipment.	See K9 of MPQVG03 – Carry Out Mine Ventilation Measurement
K12	Environmental monitoring techniques and equipment.	Describe how you would take pressure readings in the mine.
		Describe how you would take airflow readings in a mine.
		Describe how airflow readings can be converted to give a quantity reading.
		Describe how you would calculate the resistance of a mine roadway, given that you have pressure and quantity readings.

		Describe how gas readings are taken from sample points in your mine.
		Describe how pressure readings are taken from ventilation ducts to determine static pressure, velocity pressure and total pressure.
		Describe how you would take barometric pressure readings in a traverse barometric survey.
K13	Gas drainage systems and techniques.	Where applicable describe how gas can be drained from areas of a mine prior to it being worked.
		Describe how any gas produced through the drainage system may be captured and transported out of the mine.
		Outline the process and controls that are required if gas is going to be released and diluted by the main airflow within the mine.
		For coal mines that are operating longwall mining systems, explain how the drilling is completed and the gas captured as part of the mining operation.
K14	The procedures to be followed should ventilation systems and/ or equipment not be working as required.	Define your organisational procedures if: - The main ventilation system is interrupted. - An auxiliary ventilation system is interrupted.
		Define your organisational procedures should a fixed environmental monitoring system fail, and information/ alarms are no longer available locally (or to the surface).
		Define the organisational procedure if personal gas monitoring equipment fails.
K15	The legislative requirements relating to mine ventilation systems, equipment, and operational procedures.	See K9 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K16	How to develop and present a sampling plan.	See K9, K11, K14 and K16 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K17	How and why surveys of pressure and quantities should be undertaken.	See K12 above.
		Outline the importance of taking ventilation pressure readings on a periodic basis, and what they can indicate.
		Outline the application of information gathered during a trailing tube and gauge survey or Barometric Survey.

K18	How to analyse and interpret results, including analysis of trends.	See K16 and K17 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		Outline why it is important that we have trends rather than individual measurements when carrying out mine ventilation analysis.
K19	Methods to establish and calculate effective temperature.	Describe what is mean by adiabatic compression, and the impact that this has on the mine environment.
		Explain what is meant by geothermal gradient, and the impact that this has on the mine environment.
		Explain what is meant by humidity, and relative humidity of the air.
		Explain what a hygrometer is used for and how this can be used to calculate relative humidity in a mine.
		Show how the wet and dry bulb temperatures, along with the air velocity can be used to determine the effective temperature.
K20	The acceptable range of results arising from measurements and calculations in relation to mine ventilation.	See K14 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K21	The consequences of inaccurate measurement, sampling, calculation, or recording.	See K15 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K22	The procedures to be followed should results be outside acceptable range.	See K17 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K23	The procedures for recording and reporting results.	See K16 of MPQVG03 – Carry Out Mine Ventilation Measurement.

PROMM18 – Establish Mine Ventilation Methods

Legislative

PROMM18 – Establish Mine Ventilation Methods		
Knowledge Statement		Elements
K1	The legislative framework (Acts, Regulations, Approved Codes of Practice, Guidance).	Summarise the requirements of the Mines Regulations 2014 in relation to mine ventilation.
		Summarise the requirements of the Mines Regulations 2014 in relation to the control of respirable dust.
		Summarise the requirements of the Mines Regulations 2014 in relation to explosive atmospheres.
		Summarise the requirements of the Dangerous Substances and Explosive Atmosphere Regulations when zoning a mine in to hazardous and non-hazardous areas.
		Summarise the requirements of the Control of Substances Hazardous to Health when it comes to the control and limits on respirable silica.
		Summarise the requirements of EH40 when it comes to the occupational exposure limits to gases that may naturally occur within the mine.
K2	The legislative definition of a mine, and the classification of mines.	Outline the meaning of Regulation 3 of the Mines Regulations 2014, in relation to the 'meaning of a mine'.
		Summarise the requirements of the Mines Regulations 2014 in relation to Regulation 4, and the application of the regulations.
K3	The management and administration control structure and its purpose (including accountability and ultimate authority).	Outline the duties of the mine owner, as described by the Mines Regulations 2014.
		Outline the duties of the mine operator as described by the Mines Regulations 2014.
		Summarise the requirements of Regulation 10 of the Mines Regulations 2014, and the creation/ operation of a management structure.
K4	The statutory duties, role and responsibilities of mine owner, management, and supervision.	See K3 above.

K5	Personal statutory duties and responsibilities, and the limits of that responsibility.	Outline the organisational responsibilities of the person responsible for measuring, calculating, and planning the ventilation system at your mine.
		Outline what the Health and Safety at Work Act 1974 says in relation to personal responsibility.
		Outline the requirements of Regulation 11 of the Mines Regulations 2014, in relation to a person that is appointed to carry out a role at a mine.
K6	Personal area/ district of responsibility.	Persons in the management structure in relation to ventilation have areas of responsibility.
K7	Responsibilities of mine employees.	Outline the responsibilities that the organisation places on employees who have limited ventilation knowledge when it comes to the ventilation system at the mine.
K8	Legislation in relation to mine ventilation.	See K1 above.
		See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K9	Statutory requirements for a safe system of work.	Outline the requirements of Regulation 12 of the Mines Regulations 2014, in relation to the provision of information rules and schemes.
		Summarise the requirements of the Management of Health and Safety at Work Regulations 1999, and the requirement to risk assess and control the risks identified.
		Outline the requirements of the Management of Health and Safety at Work Regulations 1999, when it comes to providing adequate information, instruction, and training.
K10	Potential injuries associated with electric shock.	Apply the statement to the portfolio.
K11	Definitions of hazard, risk, accident, danger, accident rate, frequency and severity, environmental aspect, environmental incident.	Apply the statement to the portfolio.
K12	Statutory requirements and organisational procedures for the installation, commissioning, inspection, examination, testing and	Outline the requirements of Regulation 15 of the Mines Regulations 2014, in relation to the maintenance and inspection of equipment.

	maintenance of plant and equipment.	PUWER
K13	Statutory and organisational requirements for personal protective equipment (routine and emergency).	Outline your organisational requirements for the carrying of PPE when underground at a mine, and in what circumstances the PPE should be worn.
		Define any equipment that is provided for use during self-escape from the mine, what are the requirements to carry such equipment and the limitation of its use (duration/ mine atmosphere).
		Outline your organisations requirements when it comes to the provision and use of RPE.
K14	Recording procedures in relation to statutory requirements.	See K16 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K15	Statutory requirements and organisational procedures for the operation of the mine.	Very broad statement, need to think about what else is applicable from a regulatory or procedural requirement.
K16	Statutory requirements and operational procedures for ventilation, control of dust and mine gases.	See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.

Condition of the Mine

PROMM18 – Establish Mine Ventilation Methods		
Knowledge Statement		Elements
K17	The major hazards and risks associated with mining in general and the specific mine/ mining operations.	Identify what Part 3 of the Mine Regulations 2014 identifies as the major mining hazards.
		Identify the types of major mining hazards that may exist within a range of underground mining operations, and the types of activities taking place that might introduce these types of hazards.
		Identify the major mining hazards that are present within the mine at which you operate.
		Describe how the mining operation at your mine causes the major mining hazards to develop.
K18	The scope and limitations of the mine, its design and layout, including current areas of use, abandoned areas and future developments as appropriate.	Identify how the current mine layout at your operation is ventilated, and what the minimum organisational standards required.
		Identify how the mine is being developed, and how ventilation is considered as part of the planning process.
		Outline how the mine designs, historical, and future planned workings influence the mine ventilation systems.
K19	Geological features that may affect the safe operation of the mine.	Identify the potential geological features that may be present within the areas of your mine in which you operate.
		Identify how these features are considered in the mine planning and operational processes.
		Describe how the mine identifies the presence of such features to limit their safety and operational impacts.
K20	Geological and/ or physical indications of potentially deteriorating/ unsafe conditions.	Identify the organisational procedures at the mine to monitor the stability of ground conditions.
		Identify how different mining operations monitor for potentially deteriorating or unsafe geological conditions.
		Within your own organisation, identify any limits that are set in relation to geological changes, and the actions that are taken as limits are approached/ exceeded.
		Describe the implication of failing to correctly identify and react to changing geological conditions.

K21	Acceptable atmospheric conditions and functioning of ventilation system/s.	Describe the impact of barometer on the ventilation in the mine, and how this may be compensated for within the ventilation systems at your mine. Describe the impact of varying temperatures on the surface, and how this can change the ventilation system within the mine. See K7 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K22	Hazardous gasses (noxious/flammable); range of gasses, how these arise in the mine, where these might accumulate, inspection method, acceptable levels, affects if not addressed.	See K4, K5, K6 and K7 of MPQVG03 – Carry Out Mine Ventilation Measurement. See K1 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K23	Hazardous dusts (respirable/flammable); range of dusts, how these arise in the mine, where these might accumulate, inspection method, acceptable levels, affects if not addressed.	See K1 of PROMM18 – Establish Mine Ventilation Methods (Legislation). Describe what is meant by inhalable dust. Describe what is meant by respirable dust. Describe what is meant by flammable dust. Identify the main causes for the development of respirable and inhalable dust within a mine. Outline your organisational procedures for detecting inhalable and respirable dusts. Define the organisational limitations, and action levels for respirable and inhalable dust and the procedures that must be taken if these limits are approached or exceeded. In organisations that may have issues with flammable dusts, identify where this dust may accumulate. In organisations that may have issues with flammable dusts, identify how these can be dealt with to limit the potential for ignition, and the limits that may be applied to ensure that the ignition potential is reduced.
K24	Actions to be taken in the event of identifying an aspect of the condition of the mine that may lead to a hazardous situation or unsafe working.	See K17 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine). In the event that issues associated with major mining hazards are identified, define the organisational procedures to reduce the potential for this becoming a hazardous situation.

K25	The type and purpose of environmental monitoring activities.	See K5 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K11 and K12 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K26	The effect that activities in one area can have on the activity, health, and safety of others.	Identify how the mine ventilation system, if not properly controlled, may impact the health of others that are working in different locations.
		Describe the types of controls that your organisation has in place to reduce that potential impact.
		Outline other activities taking place in one area of the mine that can have a material impact on the health and safety of people working in other areas of the mine.
		For each of the areas identified, define the types of monitoring and control the organisation has in place to reduce the risk to health.
K27	How emergency situations can arise in your area of responsibility.	Outline the types of emergencies that may occur in your areas of responsibility.
K28	Responsibilities of self and others and procedures to follow in event of an emergency.	Outline how the role of the ventilation observer/ measurer and ventilation engineer may be used in an emergency.
		Define how your organisations utilises various roles, including your own in the event of an emergency underground at the mine.
K29	Operational policies and procedures for the maintenance of a safe mine environment e.g., dust suppression, degassing.	See K21, K22, K23 and K26 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K30	The terms; quantity, flow, pressure, resistance, volume, and cross-sectional area of airways.	Define what is meant by the terms identified in the knowledge statement .
		See K5 and K13 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K11, K12 and K13 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K31	Regulatory requirements and organisational procedures for reporting and recording shortfalls in the quality of the mine environment.	See K15 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K20 of MPQVG04 – Oversee Mine Ventilation Monitoring.

PROMM18 – Establish Mine Ventilation Methods		
Knowledge Statement		Elements
K32	Procedures for ensuring activities are carried out by competent personnel.	Define the key elements of the competency management system that is in place within your organisation.
		Define the requirements that your organisation has for: • Defining role competencies. • Supporting the development of new competencies. • Ensuring the person in the role are working to the required level of competencies. • Triggers for the review of individual or corporate competencies.
K33	Arrangements for first aid, health, and welfare of personnel including health monitoring.	Define the organisations requirement for providing access to first aid within the operational environment.
		Outline any health surveillance that the organisations has in place to monitor for long term workplace exposure to a range of issues (consideration should be given to dust, noise, vibrating tools/ equipment, and muscular skeletal issues).
K34	Your own responsibilities and the limits of those responsibilities.	Identify the responsibilities that you have as the person who will have ownership of the ventilation.
		Identify the limits of the authority in relation to the responsibilities outlined above.
		The process of escalation within your organisation should the issue or decision fall outside your area of responsibility.
K35	The allocation of tasks and duties.	NA
K36	The benefits of team working and methods to achieve this.	Define your organisations approach to fostering teamwork within the organisation.
		Outline what your organisation does to promote teamwork with the department/ function.
		What the benefits from fostering a team approach brings within the department/ function and organisation.

K37	Organisational reporting and recording procedures.	Define the internal reporting and escalation procedures for ventilation and environmental related matters.
K38	The importance of effective communications.	Various types of communications that exist within the organisation.
		Outline why the organisation uses different communication methods.
		Outline why having effective communication within an organisation is essential.
K39	Communication systems/ procedures in area of responsibility.	See K38 above.
K40	The dangers of working in isolation.	Identify the potential issues if decisions are made in isolation, without taking the views of others within the organisation.
K41	Organisational requirements for recording/ monitoring personnel in your area of responsibility.	NA

PROMM18 – Establish Mine Ventilation Methods		
Knowledge Statement		Elements
K42	Types, features, advantages, and limitations of ventilation systems/ equipment.	See K10 , K11 and K14 of MPQVG04 – Oversee Mine Ventilation Monitoring.
		For a forcing ventilation system identify: • Features. • Advantages. • Limitations.
		For an exhausting ventilation system identify: • Features. • Advantages. • Limitations.
		For a force/ exhaust ventilation system identify: • Features. • Advantages. • Limitations.
		Where the cutting machine has inbuilt ventilation systems identify: • Features. • Advantages. • Limitations.
K43	The mine geological/ environmental factors that may affect the choice and performance of operational ventilation systems	Define how the depth of a mine operating may influence the type of ventilation system being operated.
		Outline how virgin rock temperatures may influence the type and design of the operational ventilation system.
		Outline how water released into the mine from either natural features, or the mine ventilation system, may impact the layout of the mine, and the ventilation system.
K44	Cost/ benefit analysis of implementing method of ventilating the mine.	Take from the knowledge statement .
K45	Sources of information in relation to methods of ventilating the mine.	Take from the knowledge statement .
K46	Mine plans/ maps/ designs/ technical information.	Take from the knowledge statement .
K47	How to develop and draft an operational plan.	Define the organisational process for reviewing an operational plan for the mine, consider: • Frequency. • Content.

		• Review periods. • Acceptance (sign off).
		Outline where services (including ventilation) are considered within the operational plan.
K48	Procedures for obtaining approvals to proceed with operational plans.	Take from the knowledge statement .
K49	How to check that the plan for ventilation is compatible with mine design and operational constraints.	See K47 above.
K50	Business planning cycle and budget preparation.	See K47 above.
		Identify how the operational plan links to the wider planning process.
		Identify how organisational and departmental budgets are formed to support the delivery of the operational plan.
K51	Relevant approved codes of practice and guidance for working safely.	See K4 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K1, K3, K5 and K9 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K52	Industrial standards/ specifications in relation to mining plant and equipment	See K4 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K53	The principal activities involved in mining operations and mineral winning.	Within your organisation, define how new areas of the mine are identified as having the right characteristics for the extraction of minerals.
		Outline the process that the organisation goes through to plan access to and the development of those minerals.
		Outline the production process for the minerals and how this works to ensure that you achieve the:
		• Appropriate quality. • Appropriate extraction rates.
K54	The main functions within the operational cycle.	Give an overview of a complete operational cycle, you should include: • Establishing the equipment in advance of the cycle. • The cutting (or blasting cycles). • Mineral clearance process. • Installation of ground support. • Re-establishing ventilation.

		Where applicable, consideration should also be given to: • Installation/ extension of services (water/ compressed/ electricity) as applicable. • Extension of mineral conveying/ mineral clearance systems. • Extension of mine transport system.
K55	Mine logistics procedures and systems for the delivery of supplies.	See K54 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K56	Organisational procedures in the event of problems/ repairs occurring that are not immediately rectifiable.	NA

MPQVG05 – Design Mine Auxiliary Ventilation Systems

MPQVG05 – Design Mine Auxiliary Ventilation Systems		
Knowledge Statement		Elements
K1	Mine auxiliary ventilation systems and equipment.	See K9 and K12 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K10 of MPQVG04 – Oversee Mine Ventilation Monitoring.
		See K42 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K2	How auxiliary ventilation techniques interact.	See K42 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
		Describe the organisational procedures when siting/ positioning an auxiliary ventilation plane, giving consideration to: • Quantity of air that can be removed from a ventilation circuit to supply the fan. • Where the air coming from the area being ventilated goes to. • How contaminants within the air are removed. • Monitoring that is in place to ensure the air entering the area to be developed is free of contaminants (toxic/ noxious/ poisonous/ flammable gasses). • The impact on heat and humidity within the work area, and on work areas on the return side of the auxiliary ventilation system.
		Outline how auxiliary ventilation systems of different types can be used in combination, and under what circumstances these combination of ventilation systems might be used.
K3	How auxiliary ventilation is compatible with the main mine ventilation systems.	See K9 and K12 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K10 of MPQVG04 – Oversee Mine Ventilation Monitoring.
		See K42 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
		See K2 above.
K4	The measuring and calculating techniques to establish the requirements for auxiliary ventilation systems.	See K14 , K15 and K16 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K10 , K11 , K12 , K14 and K16 of MPQVG04 – Oversee Mine Ventilation Monitoring.
		See K2 above.

K5	The procedures to be followed should systems or equipment not be working as required.	See K14 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K6	How auxiliary ventilation rules are drafted.	Within your organisation outline the contents of the auxiliary ventilation rules, and the purpose of the key parts of those auxiliary ventilation rules.
K7	The legislative requirements relating to auxiliary ventilation systems, equipment, and operational procedures.	See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K8	The organisational procedures for approving, implementing, or amending ventilation arrangements.	Identify the organisational procedure for making amendments to the ventilation systems in the mine.
		Outline how alterations within one area of ventilation can potentially impact other areas within the same mine.
		Define the organisational checks that must be completed following any significant alteration of the mine ventilation or auxiliary ventilation system.

MPQVG13 – Design and Maintain Ventilation Standards

MPQVG13 – Design and Maintain Ventilation Standards		
Knowledge Statement		Elements
K1	Legislative framework including Acts, Regulations, Approved Codes of Practice, and Guidance.	See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K1 and K9 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K2	The legislative definition of a mine, and the classification of mines.	See K2 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K3	The management and administration control structure and its purpose, including accountability and ultimate authority.	See K3 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K4	The statutory duties, role and responsibilities of the mine owner, management, and supervision.	See K3 and K4 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K5	Your statutory duties and personal responsibilities, and the limits of that responsibility.	See K5 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K6	The responsibilities of mine employees.	Outline what the Health and Safety at Work Act says in relation to the duties of employees, and in particular the requirements when it comes to equipment provided for safety.
K7	The legislation in relation to mine ventilation.	See K1 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
		See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K8	The statutory requirements for a safe system of work	See K9 of PROMM18 – Establish Mine Ventilation Methods (Legislation).
K9	The definitions of: hazard, risk, accident, danger, accident rate, frequency and severity, environmental aspect, environmental incident.	Provide a description for each of the terms identified in the knowledge statement .
K10	The duties, powers, and responsibilities in the event of a mine emergency situation.	Within your organisation, outline the role of the Ventilation Measurer in the event of an emergency underground.
		Within your organisation, outline the role of the Ventilation Engineer in the event of an emergency underground.

K11	The statutory requirements and organisational procedures for the installation, commissioning, inspection, examination, testing and maintenance of ventilation systems, plant, and equipment.	Outline the statutory requirements to ensure that any equipment installed is commissioned, and periodically inspected, examined, maintained, and tested. Define how your organisation commissions, tests, and maintains the ventilation system at your mine.
K12	Statutory and organisational requirements for personal protective equipment, in routine and emergency situations.	Outline the requirements of the Mines Regulations 2014, when it comes to having arrangements in place when it comes to escape and rescue underground. Define how your organisation meets these responsibilities defined in the regulations. Outline where the provision of PPE sits within the hierarchy of controls. See MG1 and MG2 (safe in the underground environment) course for the organisational standards relating to PPE).
K13	The recording procedures in relation to statutory requirements.	See K14 of PROMM18 – Establish Mine Ventilation Methods (Legislation). See K31 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K14	The statutory requirements and organisational procedures for the operation of the mine.	See K3 and K4 of PROMM18 – Establish Mine Ventilation Methods (Legislation). Outline the various rules under the Mines Regulations 2014 that the mine operator should have in place to operate the mine. Define the way your organisation produces procedures for the operation of the mine at which you work. Outline the process that your organisation uses to verify that the procedures that it has in place are effective in managing the operation of the mine.
K15	The statutory requirements and operational procedures for ventilation, control of dust, and mine gases.	See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.
K16	The major hazards and risks associated with mining in general and the specific mine and mining operations.	See K17 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).

K17	The scope and limitations of the mine, its design and layout, including current areas of use, abandoned areas, and future developments.	See K18 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K18	Geological features that may affect the ventilation or safe operation of the mine.	See K19 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K19	Geological and physical indications of potentially deteriorating or unsafe conditions.	See K20 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K20	The acceptable environmental conditions and functioning of ventilation systems.	See K7 of MPQVG04 – Oversee Mine Ventilation Monitoring.
		See K21 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K21	The range of hazardous gasses (noxious or flammable) in mines; how these arise in the mine, where these might accumulate, inspection methods, acceptable levels, and their effects if not addressed.	See K22 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
		Outline your organisation's procedures for reventilating or degassing an area of the mine that has had the ventilation reduced and allowed flammable/ explosive/ noxious gasses to accumulate.
		When carrying out degassing operations, outline the organisational procedure to ensure that other persons/ other parts of the operation are not impacted by the planned degassing of that area of the mine.
K22	The range of hazardous dusts (inhalable or flammable) in mines; how these arise in the mine, where these might accumulate, inspection methods, acceptable levels, and their effects if not addressed.	See K23 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K23	The actions to be taken in the event of identifying an aspect of the condition of the mine that may lead to a hazardous situation or unsafe working.	See K24 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K24	The type and purpose of environmental monitoring activities.	See K25 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).

K25	The effect that activities in one area of a mine can have on the activity, health, and safety of others.	See K26 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K26	How emergency situations can arise in your area of responsibility.	See K27 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K27	The responsibilities of yourself and others and the procedures to follow in the event of an emergency situation.	See K28 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
K28	The operational policies and procedures for the maintenance of a safe mine environment, including dust suppression and degassing.	See K23 of PROMM18 – Establish Mine Ventilation Methods (Condition of the Mine).
		See K3 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K6 of MPQVG05 – Design Mine Auxiliary Ventilation Systems.
		Outline the minimum organisational standards relating to quantities of: • Oxygen. • Explosive gasses. • Noxious/ toxic/ poisonous gases. • Respirable silica dust. • Inhalable dust. • Diesel exhaust emissions.
		Where an area exceeds the minimum organisational standard outlined above, outline the organisational procedure for degassing that area of the mine, and the considerations that are given to other areas of the mine that may be impacted by those activities.
		Outline the types of dust control techniques that are used around the mine to ensure that the minimum organisational standards are not exceeded, and the process that is used to ensure that these systems continue to operate effectively.
K29	The terms; quantity, flow, pressure, resistance, volume, and cross-sectional area of airways.	Define what is meant by the terms identified in the knowledge statement .
		See K5 and K13 of MPQVG03 – Carry Out Mine Ventilation Measurement.
		See K11 , K12 and K13 of MPQVG04 – Oversee Mine Ventilation Monitoring.

K30	Regulatory requirements and organisational procedures for reporting and recording shortfalls in the quality of the mine environment.	Outline the requirements within regulation to record the ventilation readings that are routinely taken.
		Define the process within your organisation for recording any information relating to the effectiveness of the mine ventilation system.
		Outline how shortfalls in the effectiveness of the mine ventilation system are identified, and the actions that you would take should any shortfall.
K31	The procedures for ensuring activities are carried out by competent personnel.	Outline the competencies that your organisation would expect a person carrying out ventilation and other statutory measurements to have.
		Define how the competency management system within your organisation works.
		Outline the organisational procedure for reviewing, refreshing or retesting competencies as part of the competency management system.
K32	The arrangements for first aid, health, and welfare of personnel.	Define legislative requirements to have access to first aid.
		Define how your organisation meets its legislative requirements.
		Define the facilities that are present on site to ensure that the welfare of people in your organisation is considered and catered for.
K33	Your own personal responsibilities and the limits of those responsibilities.	See K34 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).
K34	The organisational procedures for the allocation of tasks and duties.	See K56 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K35	The benefits of team working and methods to achieve team working.	See K36 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).
K36	Organisational reporting and recording procedures.	See K37 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).
K37	The importance of effective communications.	See K38 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).

K38	Communications systems and procedures in your area of responsibility.	See K39 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).
K39	The dangers of working in isolation.	See K40 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).
K40	The organisational procedures for recording and monitoring personnel in your area of responsibility.	See K41 of PROMM18 – Establish Mine Ventilation Methods (Working with Others).
K41	The range, types, features, advantages and limitations of mine ventilation systems and equipment.	See K42 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K42	The mine geological and environmental factors that may affect the choice and performance of operational ventilation systems.	See K43 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K43	Cost/ benefit analysis of implementing methods of ventilating the mine.	See K44 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K44	The sources of information in relation to methods of ventilating the mine, mine ventilation systems and equipment.	See K45 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K45	Mine plans, maps, designs, and ventilation technical information.	See K46 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K46	How to develop and draft a ventilation operational plan.	See K47 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K47	The procedures for obtaining approvals to proceed with ventilation operational plans.	See K48 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K48	How to check that the plan for ventilation is compatible with mine design and operational constraints.	See K49 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K49	The business planning cycle and budget preparation.	See K50 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K50	The Approved Codes of Practice and Guidance for working safely.	See K51 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K51	The industrial standards and specifications in relation to mining ventilation plant and equipment.	See K52 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).

K52	The principal activities involved in mining operations and mineral winning.	See K53 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K53	The main functions within the operational cycle.	See K54 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K54	Mine logistics procedures and systems for the delivery of supplies.	See K55 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K55	The organisational procedures in the event of problems or repairs occurring that are not immediately rectifiable.	See K56 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations).
K56	The laws relating to gasses.	See K4 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K57	The laws of thermodynamics, at a basic level.	Define the first law of thermodynamics (<i>conservation of energy</i>).
		Define the second law of thermodynamics (<i>the increase of entropy</i>).
		Define the third law of thermodynamics (<i>entropy approaching a steady state</i>).
		For each of the laws outline the basic principles of how this applies to ventilation and other systems within a mine environment.
K58	How mine ventilation systems can interact.	Define how various mine ventilation systems can interact. In the answer you should consider: • What different systems (force/ exhaust/ booster fans) interact and effect the mine ventilation system. • How mining operations and the installation of equipment can impact the airflow in the mine. • How changes to the airflow can be affected by the size of the mining, abandoning areas, creating new areas.
		See K2 of MPQVG05 – Design of a Mine Ventilation System.
K59	How abandoned workings can affect mine ventilation.	See K9 of MPQVG04 – Oversee Mine Ventilation Monitoring.

K60	The techniques for measuring and calculating to establish the requirements of auxiliary ventilation systems.	See K12 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K61	The procedures to be followed should ventilation systems or equipment not be working as required.	See K22 of MPQVG04 – Oversee Mine Ventilation Monitoring.
K62	The methods of presenting draft ventilation designs.	See K46 and K47 of PROMM18 – Establish Mine Ventilation Methods (Mine Operations). When producing a mine ventilation plan, outline the type of information that would need to be include on the plan. Define how your organisation would require any information presenting so that: - It is understood by the operational team that will make any decisions. - That the implications of the design are understood and can be factored into the mine design and layout. Outline the modelling techniques used by the organisation, and how these are used to understand the ventilation planning requirements into the future.
K63	When exemptions to ventilation regulatory requirements could be permitted.	Outline the procedure for ensuring that the risks that are present in the mine are adequately controlled, and the part that the ventilation planning has ensuring that these risk are controlled. Identify how ventilation models may be used to assist in predicting the effectiveness of the mine layout and ventilation system in controlling any environmental hazards that have been identified.
K64	The scope and requirements of current exemptions to regulatory requirements.	NA
K65	The organisational procedures for approving, implementing, or amending ventilation arrangements.	See K8 of MPQVG05 – Design of a Mine Ventilation System.
K66	Ventilation modelling techniques.	Identify the various modelling techniques that may be used to plan the mine ventilation systems Define the type of information that would need to be collected in relation to existing workings for a ventilation model to be established/ built.

		Define the type of information that would need to be provided to allow future mine workings to be modelled accurately.
		Identify the means by which the accuracy of any modelling could be tested to ensure that the results are valid and representative of current and planned future workings.
		Define the organisational requirements for modelling ventilation systems as part of their design and commissioning.
K67	The scope and limitations of ventilation measuring or testing equipment.	Define the type of ventilation measuring equipment used by your organisation
		Outline any limitation that the equipment used by the organisation has
		If any, what actions are taken to reduce the impact of those limitations or reduce the impact of the accuracy of the information to be collated.
K68	The incidence and effects of sensor cross sensitivity.	Define the types of handheld gas monitors that are used in your organisation, and what, if any, cross sensitivity exists to: • Other gasses that may be present within the mine environment. • Any substances or materials that are introduced (for example oil) from the strata as part of the mining process. • Any substances or materials that are imported as part of the mining process.
		Define the types of fixed gas monitors that are used in your organisation, and what if any cross sensitivity exists to: • Other gasses that may be present within the mine environment. • Any substances or materials that are introduced (for example oil) from the strata as part of the mining process. • Any substances or materials that are imported as part of the mining process.
K69	The requirements for ventilation procedures in normal and emergency situations.	Outline any specific changes that have been planned for the ventilation system in the event of an emergency, and: • The types of changes that may be made. • Who has the authority to request and implement changes to the ventilation system? • The types of situations where it may be necessary or prudent to make alterations to the ventilation systems.

		Why is it important that ventilation changes are not made in an emergency without the process being authorised.

New Section – Environmental Monitoring Systems

MPQVG13 – Design and Maintain Ventilation Standards		
Knowledge Statement		Elements
K1	Selection of fixed monitoring instrumentation.	Identify the advantages of fixed environmental monitoring systems in an underground mine.
		Identify the types of gasses that may be present in your mine, and how you would choose the appropriate monitoring device.
		Outline the limitations in terms of the range of the instruments, and circumstances where the range may have an impact on the readings.
		Outline where the types of instruments selected may have a cross sensitivity to other operations or other gasses that may be present in the mine, and how you deal with these types of issues.
K2	Siting of fixed instruments.	Outline any organisational procedures that determine where fixed monitoring systems are installed in your mine.
		Outline the procedures to manage change as the mine layout evolves, and the location of fixed monitoring systems may need to be altered.
		Define how you would ensure that any fixed monitoring installed samples a representative sample of the mine air.
K3	Commissioning and testing.	Define how fixed monitoring systems are commissioned when installed at the mine.
		Outline how local and remote readings are verified to ensure that they are the same and the process that is used to adjust ensure that the instruments read correctly locally and remotely.
		Define the potential issues that exist with having instruments that: • Read too high. • Read too low.
		Outline the procedures used for periodically testing the calibration of the instruments on site.
		Outline the organisational requirements for the frequency of testing.
		Define the tolerances that are acceptable to your organisation when testing these types of fixed instruments.

K4	Alarm levels.	For the typical instruments that are used by your organisation, define the alarm levels that are set.
		Outline why these alarm levels have been selected within your organisation, and the implications of these levels being exceeded.
		Describe how the alarms generated are indicated locally, and where applicable remotely.
		Define the typical organisational responses when an alarm is triggered for the types of monitoring system installed in the mine.
		Outline the organisational procedure required for adjusting alarm/ trigger levels.
K5	Automatic safety interlocks.	Describe how any monitoring systems installed may be interlocked to trigger automatic responses (for example the automatic isolation of power).
		Where there are automatic interlocks, outline the levels at which these operate, and how these levels differ from the alarm levels.
K6	Faulty monitoring systems.	Define the organisational procedure for dealing with a faulty environmental monitor.
		Outline any restrictions that are placed on the operation, should an environmental monitor fail in service.
		Define those organisational procedures, that allow a faulty environmental monitor to be overridden to allow operations to continue, and if applicable any arrangements that need to be in place.
		Describe the procedure that is to be followed when changing a faulty instrument, include testing the new instrument being installed and the process to ensure that the faulty instrument is removed from circulation until it has been repaired.
K7	Recording of information (remotely).	Outline how the information from the fixed monitoring systems installed underground is recorded remotely.
		Outline how the information recorded is utilised to generate information that is used to improve the mine ventilation system.

K8	Personal gas monitoring	Outline your organisation's arrangements for providing fixed monitoring systems, and the requirements for persons underground to have these types of instruments available.
		Describe the alarm levels that are set on the fixed monitors and the actions that are required should they be triggered.
		Outline the organisational requirements for the checking of personal monitors before they are issued/ taken below ground.
		Outline the organisational procedures: 1. Should a monitor be faulty when tested at the point of issue. 2. If a monitor becomes faulty when it is being used in the underground environment.
K9	Other monitoring systems.	Outline where you might find tube bundle monitoring systems in a mine.
		Outline where an organisation may use stain tubes or other types of monitoring systems.

Performance Elements

The performance elements have been captured directly into the portfolio layout, the tables in this section provide information on the performance statements listed within the National Occupational Standards.

MPQVG01 (MT17) – Operate Safely in the Mine Environment

These performance elements can be satisfied by completing the common induction module (working safely and efficiently in the underground environment).

MPQVG02 (MT18) – Conform to Efficient Work Practices

These performance elements can be satisfied by completing the common induction module (working safely and efficiently in the underground environment).

MPQVG03 – Carry Out Mine Ventilation Measurements

MPQVG03 – Carry Out Mine Ventilation Measurements		
Performance Statement		Elements
P1	Select equipment to carry out ventilation measurements and sampling in the mine.	Included within the portfolio.
P2	Check the condition and operation of the selected equipment.	Included within the portfolio.
P3	Position equipment and take measurements or samples.	Included within the portfolio.
P4	Complete calculations based on measurements taken.	Included within the portfolio.
P5	Report results.	Included within the portfolio.
P6	Carry out work activities according to approved policies, procedures and practices.	

MPQVG04 – Oversee Mine Ventilation Monitoring

MPQVG04 – Oversee Mine Ventilation Monitoring		
Performance Statement		Elements
P1	Determine the ventilation related measurements and samples to be taken.	Included within the portfolio.
P2	Specify the equipment to be used.	Included within the portfolio.
P3	Develop a sampling plan showing sampling locations and frequencies.	Included within the portfolio.
P4	Organise and undertake surveys.	Included within the portfolio.
P5	Ensure that measurements and samples are taken according to plan and organisational procedures.	Included within the portfolio.
P6	Check calculations.	Included within the portfolio.
P7	Analyse and interpret results.	Included within the portfolio.
P8	Complete records and reports complying with organisational and regulatory requirements.	Included within the portfolio.
P9	Report results according to organisational procedures.	Included within the portfolio.

PROMM18 – Evaluate Mine Ventilation Methods

PROMM18 – Evaluate Mine Ventilation Methods		
Performance Statement		Elements
P1	Identify and confirm the objective (requirements for ventilation).	Included within the portfolio.
P2	Obtain relevant, current, and applicable sources of information,	Included within the portfolio.
P3	Enlist advice/ support of other management/ specialists as appropriate.	Included within the portfolio.
P4	Identify the specification/s for plant and equipment required to meet the objective.	Included within the portfolio.
P5	Identify personnel required to meet the objective.	Included within the portfolio.
P6	Ascertain direct and indirect risks associated with proposed method of ventilation.	Included within the portfolio.
P7	Confirm all approvals have been granted prior to work commencing.	Included within the portfolio.
P8	Implement plans to obtain plant, equipment, and personnel to achieve the objective.	Included within the portfolio.
P9	Specify the work to be carried out, and the methods to be employed.	Included within the portfolio.
P10	Check to ensure the methods employed will not endanger the health, safety or welfare of persons engaged in the work.	Included within the portfolio.
P11	Ensure sufficient appropriate safety systems and equipment are made available.	Included within the portfolio.
P12	Ensure details of the work to be carried out is communicated appropriately to all relevant persons.	Included within the portfolio.
P13	Ensure lines of authority and responsibility are defined, communicated, and understood.	Included within the portfolio.
P14	Ensure adequate provision of supervision.	Included within the portfolio.
P15	Authorise the commencement of the ventilation work.	Included within the portfolio.

MPQVG05 – Design Mine Auxiliary Ventilation Systems

PROMT11 (MT11) – Maintaining Electrical Equipment		
Performance Statement		Elements
P1	Identify locations that require auxiliary ventilation.	Included within the portfolio.
P2	Determine the equipment or system that would provide the required ventilation.	Included within the portfolio.
P3	Check the design and equipment or system complies with regulatory and organisational requirements.	Included within the portfolio.
P4	Carry out measurements and calculations to determine the requirements of auxiliary ventilation systems.	Included within the portfolio.
P5	Commission installed equipment.	Included within the portfolio.
P6	Carry out ongoing measurements and calculations to organisational schedules.	Included within the portfolio.

MPQVG13 – Design and Maintain Mine Ventilation

MPQVG13 – Design and Maintain Mine Ventilation Standards		
Performance Statement		Elements
P1	Identify and confirm the requirements for ventilation.	Included within the portfolio.
P2	Obtain relevant, current, and applicable sources of information.	Included within the portfolio.
P3	Enlist advice and support of other management, specialists, or regulatory bodies.	Included within the portfolio.
P4	Design ventilation systems to meet the requirements.	Included within the portfolio.
P5	Ascertain that the proposed systems are compatible with the manager's scheme for the operation of the mine.	Included within the portfolio.
P6	Identify the specifications for plant and equipment required to meet the requirements.	Included within the portfolio.
P7	Develop models to test the design.	Included within the portfolio.
P8	Ascertain direct and indirect risks associated with proposed method of ventilation.	Included within the portfolio.
P9	Develop operational procedures for the systems, in normal and in emergency situations.	Included within the portfolio.
P10	Confirm all approvals have been granted prior to installation or modification work commencing.	Included within the portfolio.
P11	Monitor and evaluate performance of ventilation systems.	Included within the portfolio.
P12	Amend designs, models, systems, and procedures.	Included within the portfolio.