Title	**Describe, develop, and maintain basic ventilation systems for an underground coal mine**		
Level	**4**	**Credits**	**15**

Purpose	People credited with this unit standard are able to: describe the basic principles and practices of ventilation; develop basic ventilation circuits; read and interpret a basic ventilation plan; measure, maintain, and document ongoing airflow, air quantity, and air quality; measure gases and describe their impact in an underground coal mine; and demonstrate knowledge of fires, spontaneous combustion, and hazardous atmospheres in underground coal mines.

Classification	Extractive Industries > Underground Extraction

Available grade	Achieved

Entry information	
Prerequisites	Unit 21281, *Interpret and test for gases in an underground coal mine*, or demonstrate equivalent knowledge and skills

Guidance Information

1 Performance of the outcomes of this unit standard must comply with the following:
Health and Safety at Work Act 2015 (HSW);
Health and Safety at Work Regulations 2016;
Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016;
approved codes of practice issued pursuant to the HSW Act.

2 Any new, amended, or replacement Acts, regulations, standards, codes of practice, guidelines, or authority requirements or conditions affecting this unit standard will take precedence for assessment purposes, pending review of this unit standard.

3 Joint assessment must be conducted in the assessment of this unit standard because of the high degree of risk.

To conduct a joint assessment, two assessors, or one assessor and one technical verifier, must have witnessed the learner undertaking the tasks required in the unit standard and have come to the same conclusion in regards to the learner being competent or not yet competent. At least one assessor or verifier must hold the unit standard they are assessing on their NZQA Record of Learning.

4 Due to the high degree of risk associated with this unit standard, the assessment process must include a learner interview with one or both assessors.

5 Definitions
Company procedures mean the documented methods for performing work activities and include health and safety, operational, environmental, and quality management requirements. They may refer to legislation, regulations, guidelines, standard operating procedures, manuals, codes of practice, or policy statements.
Industry best practice may be documented in management plans, control plans, company procedures, managers' rules, occupational health and safety policy, industry guidelines, codes of practice, manufacturers' instructions, and safe working and/or job procedures (or equivalent).
Basic refers to elementary or entry level in relation to the different contexts of this unit standard.

6 This unit standard is intended for, but is not limited to, workplace assessment.

7 All evidence for assessment against this unit standard must be in accordance with industry best practice and company procedures.

Outcomes and performance criteria

Outcome 1

Describe the basic principles and practices of ventilation for an underground coal mine.

Performance criteria

1.1 The basic principles and practices of ventilation for coal mines are described in terms of effective and ineffective air circulation.

Range air movement, gas accumulation, pressure differential, resistance, effects of temperature, air density, air quantity, air power, underground area and volume.

Outcome 2

Develop basic ventilation circuits for an underground coal mine.

Performance criteria

2.1 Design meets requirements of industry best practice.

2.2 Laws relating to airflow are described and evaluated in terms of their practical application to an underground coal mine.

Range includes but is not limited to – simple Atkinson formula application, resistance measurements, pressure/temperature/volume relationships, simple air splits and series ventilation systems, single entry ventilation.

2.3 Ventilation control devices (VCDs) are selected and positioned to ensure optimal atmospheric conditions for mine safety and operation.

Range may include but is not limited to – main fans, auxiliary fans, ducting, brattice screens and leads, stoppings, doors, regulators, air crossings, air movers.

2.4 Materials used in VCD construction and airways are described in terms of the end purpose for which they are suitable.

Range may include but is not limited to – timber and brattice, brick, concrete, grout, shotcrete, other spray on sealant and fortification.

Outcome 3

Read and interpret a basic ventilation plan for an underground coal mine.

Performance criteria

3.1 The ventilation system is described in accordance with the specified plan.

3.2 Standard symbols on the ventilation plan are interpreted in accordance with the approved survey code of practice.

Outcome 4

Measure, maintain, and document ongoing airflow, air quantity, and air quality in an underground coal mine.

Performance criteria

4.1 Airflow is measured in accordance with equipment manufacturers' specifications.

Range includes – anemometer;
may include – smoke tubes, pitot tubes, velometer.

4.2 Air quality is measured in accordance with equipment manufacturers' specifications.

Range includes – humidity measurement, gas detection, temperature, dust monitoring, barometric pressure.

4.3 Actions to minimise hazards are implemented.

4.4 Required adjustments are made to ventilation equipment to maintain required airflow, air quantity, and air.

Range includes – approval required, ventilation officer, authorised people; may include but is not limited to – regulator, doors, stoppings, seals, shafts, air crossings, auxiliary fans, ducting, air movers, brattice leads, hurdles.

4.5 Documentation and reporting is completed.

Outcome 5

Measure gases and describe their impact in an underground coal mine.

Performance criteria

5.1 Gases and gas mixtures are measured and calculated in working places and within basic ventilation systems.

Range monitoring, types, volumes, mixture, location, sources.

5.2 Potential hazards are identified through detection methods and analysis of gas monitoring results.

Range includes but is not limited to – toxic and noxious gases, spontaneous combustion, flammable and explosive gases, oxygen depletion situations.

5.3 Methods of eliminating and/or minimising potential hazards are described in accordance with the analysis of results.

Outcome 6

Demonstrate knowledge of fires, spontaneous combustion, and hazardous atmospheres in underground coal mines.

Performance criteria

6.1 Fires in underground mines are described in terms of their primary causes.

Range may include but is not limited to – spontaneous combustion, ignition sources, combustible material, flammable substances, electricity, other fire risks.

6.2 Spontaneous combustion in underground coal mines is described in terms of its process, causes, and controls.

6.3 Underground fires are described in terms of the procedures and equipment used to control and combat them.

Range fire fighting methods, emergency responses, fire fighting equipment, neutralising agents.

6.4 Hazardous atmospheres in a selected underground coal mine are described in terms of the methods used to control and combat them.

Planned review date	31 December 2022

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 August 2000	31 December 2017
Review	2	24 November 2005	31 December 2017
Rollover and Revision	3	16 July 2010	31 December 2017
Review	4	18 June 2015	31 December 2019
Review	5		N/A

Consent and Moderation Requirements (CMR) reference	0114

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact MITO New Zealand Incorporated info@mito.org.nz if you wish to suggest changes to the content of this unit standard.