

Title	Develop and maintain basic ventilation systems for a non-coal underground operation		
Level	4	Credits	15

Purpose	People credited with this unit standard are able to, for a non-coal underground operation: describe the basic principles and practices of ventilation; develop basic ventilation systems; read and interpret a basic ventilation plan; measure, maintain, and document ongoing airflow, air velocity, air quantity, and air quality; measure gases and describe their potential hazards in a non-coal underground operations; and describe fires and hazardous atmospheres.
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Classification	Extractive Industries > Underground Extraction
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Available grade	Achieved
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Prerequisites	Unit 30900, <i>Test for gases, interpret findings, and demonstrate knowledge of follow-up actions in a non-coal underground operation</i> , or demonstrate equivalent knowledge and skills
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Guidance Information

- 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 (General Risk and Workplace Management) Regulations 2016;
 - Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016;
 - Health and Safety at Work (Worker Engagement, Participation, and Representation) Regulations 2016;
 - Approved codes of practice issued pursuant to the HSW Act.
 - Workplace exposure standards and biological exposure indices; <https://www.worksafe.govt.nz/topic-and-industry/monitoring/workplace-exposure-standards-and-biological-exposure-indices/>
 - Ventilation in underground mines and tunnels; <https://www.worksafe.govt.nz/topic-and-industry/extractives/mining/ventilation-in-underground-mines-and-tunnels/>
 - approved codes of practice issued pursuant to the HSW Act.

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.

- 2 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 Achievement.

- 3 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.
- 4 **Definitions**
Basic refers to elementary or entry level in relation to the ventilation systems, the calculations required and the type of mine and tunnel being ventilated.
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 good 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).
- 5 An *underground operation* includes extractive or tunnelling operations.
- 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 good practice and company procedures.

Outcomes and performance criteria

Outcome 1

Describe the basic principles and practices of ventilation for a non-coal underground operation.

Performance criteria

- 1.1 The basic principles and practices of ventilation for non-coal underground mines or tunnels are described in terms of effective and ineffective air circulation.
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| Range | air movement, underground gases, pressure differential, resistance, effects of temperature, air density, air quantity, air power, underground area and volume. |
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Outcome 2

Develop basic ventilation systems for a non-coal underground operation.

Performance criteria

- 2.1 Design is selected and checked to meet the requirements of industry good practice.
- 2.2 Laws relating to airflow are described and evaluated in terms of their practical application to a non-coal underground operation.
- Range includes but is not limited to – simple Atkinson formula application, resistance measurements, pressure/temperature/volume relationships, series ventilation systems, single entry ventilation.
- 2.3 Ventilation control devices (VCDs) are selected and positioned to ensure optimal atmospheric conditions for safety and operation.
- Range may include but is not limited to – main fans, auxiliary fans, ducting, stoppings, doors, 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, brick, concrete, grout, shotcrete, fabric, steel.

Outcome 3

Interpret a basic ventilation plan for a non-coal underground operation.

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 airflow, air velocity, air quantity, and air quality in a non-coal underground operation.

Performance criteria

- 4.1 Airflow, air quantity and air velocity are measured in accordance with equipment manufacturers' specifications.
- Range includes – use of anemometer, ventilation traverse method.
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 quality.

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

4.5 Ensure documentation and is completed.

Outcome 5

Measure gases and describe their potential hazards in a non-coal underground operations.

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 – flammable, toxic and noxious gases, low oxygen environments.

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

Outcome 6

Describe fires and hazardous atmospheres in non-coal underground operations.

Performance criteria

6.1 Fires in non-coal underground mines and tunnels are described in terms of their primary causes.

Range may include but is not limited to – ignition sources, shot-firing, internal combustion engines, compressors, lightning strikes, combustible material, flammable substances, electricity, other fire risks.

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

Range includes but is not limited to – relevant principal control plans and principal hazard management plans, fire fighting methods, emergency responses, fire fighting equipment, neutralising agents.

- 6.3 Hazardous atmospheres in a selected non-coal underground operation are described in terms of the methods used to control and manage them.

Planned review date	31 December 2029
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	1 March 2018	31 December 2027
Review	2	29 May 2025	N/A

Consent and Moderation Requirements (CMR) reference	0114
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.