Title	**Describe and operate closed circuit breathing apparatus in an underground operation**		
Level	**4**	**Credits**	**10**

Purpose	People credited with this unit standard are able to: describe the physiology of respiration in relation to conditions in an underground operation and the use of closed circuit breathing apparatus; describe the working mechanisms and principles of the closed circuit breathing apparatus; operate a closed circuit breathing apparatus in an underground operation; decommission, clean, reassemble, test, and store closed circuit breathing apparatus; and complete documentation.

Classification	Extractive Industries > Underground Extraction

Available grade	Achieved

Prerequisites	Unit 7146, *Demonstrate basic knowledge and ability required to work in an underground operation*; Unit 6400, *Manage first aid in an emergency situation*; Unit 6401, *Provide first aid*; Unit 6402, *Provide basic life support*; and Unit 21281, *Test for gases, interpret findings, and demonstrate knowledge of follow-up actions in an underground coal mine*; or Unit 30900, *Test for gases, interpret findings, and demonstrate knowledge of follow-up actions in a non-coal underground operation*; or Unit 25510, *Operate an atmospheric testing device to determine a suitable atmosphere exists to work safely*; 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 (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;
WorkSafe New Zealand Act 2013.

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 Definitions
Industry best practice refers to those practices which competent practitioners within the industry recognise as current industry best practice. These may be documented in management 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).
Underground plan refers to the current topographical map of the incident area.
Underground operation includes extractive or tunnelling operations.
Closed circuit breathing apparatus refers to an apparatus of the type in which the exhaled breath is rebreathed by the wearer after the carbon dioxide has been effectively removed and oxygen concentration restored to suitable levels.

4 Assessment towards Outcome 3 of this unit standard can be conducted practically in a face-to-face simulated environment to operate the closed circuit breathing apparatus.

Outcomes and performance criteria

Outcome 1

Describe the physiology of respiration and the effects of an irrespirable atmosphere, in relation to conditions in an underground operation and the use of closed circuit breathing apparatus.

Performance criteria

1.1 The composition of the atmosphere, average oxygen requirements for an adult, and respiratory and blood circulations systems are described in relation to normal daily respiration.

1.2 The oxygen needs of an adult are described in relation to average oxygen consumption during various activities.

Range activities may involve a range of exertion from – light exertion, average exertion, heavy exertion, very heavy exertion.

1.3 The effects of oxygen deficiency and toxic atmosphere are described in relation to asphyxia.

1.4 The factors that affect the oxygen consumption rates of operators using closed circuit breathing apparatus are described.

Range work rate, workload, vital lung capacity, physical fitness, psychological stability, heat and humidity.

1.5 The requirements of continuous gas monitoring are described and required action to be taken is explained for an irrespirable atmosphere.

1.6 The required treatment for, and symptoms of, oxygen deficiency and asphyxia in an irrespirable atmosphere are described.

Outcome 2

Describe the working mechanisms and principles of the closed circuit breathing apparatus.

Performance criteria

2.1 Working principles of the breathing apparatus are described in terms of a closed circuit operation.

2.2 The components and functions of the closed circuit breathing apparatus are described in terms of their purpose and role in the aiding of respiration.

2.3 The warning devices and readable gauges are described in terms of required actions and reactions.

2.4 The frequency of routine and standard tests is described in terms of the need to detect flaws and leaks in the breathing apparatus.

Outcome 3

Operate a closed circuit breathing apparatus in an underground operation.

Performance criteria

3.1 The current underground plan or simulated environment is viewed and an operational plan is formulated in accordance with industry best practice.

3.2 Essential equipment is checked in accordance with manufacturer's instructions.

3.3 Breathing apparatus is tested in accordance with manufacturer's instructions.

3.4 The closed circuit breathing apparatus is operated in accordance with the operational plan, and procedures.

Range procedures include but are not limited to – Captain’s check, entry and exit control, atmospheric testing.

Outcome 4

Decommission, clean, reassemble, test, and store closed circuit breathing apparatus.

Performance criteria

4.1 The closed circuit breathing apparatus is turned off, removed from carry position, and placed in a safe position.

4.2 Contaminated parts of the closed circuit breathing apparatus are dismantled, cleaned, and dried in accordance with manufacturer’s instructions.

4.3 The closed circuit breathing apparatus is reassembled using clean and dry replacement parts in accordance with manufacturer's instructions.

4.4 Test functions are applied to the closed circuit breathing apparatus, recorded, set tagged, and capped in accordance with manufacturer's instructions.

4.5 Closed circuit breathing apparatus is stored for immediate use in accordance with manufacturer's instructions and industry best practice.

Outcome 5

Complete documentation.

Range documentation may include but is not limited to – Team Captain's book, operational plans, photographs, operational recordings, relief teams, fresh air base recording sheets, incident reports, surface documentation.

Performance criteria

5.1 Documentation is completed in accordance with industry best practice.

5.2 Documentation is made available for team de-briefs in accordance with industry best practice.

Planned review date	31 December 2023

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	22 October 2003	31 December 2014
Rollover and Revision	2	23 February 2007	31 December 2014
Rollover and Revision	3	16 July 2010	31 December 2017
Review	4	21 May 2015	31 December 2020
Rollover and Revision	5	25 January 2018	31 December 2020
Review	6	27 June 2019	N/A

Consent and Moderation Requirements (CMR) reference	0014

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.