

Title	Demonstrate knowledge of mining methods, and analyse and select plant for underground coalmines		
Level	6	Credits	20

Purpose	People credited with this unit standard are able to: demonstrate knowledge of geological features of coal measures in relation to underground mining methods; describe support requirements and potential hazards in underground coal mines; demonstrate knowledge of underground coal mining development methods, and underground coal extraction methods; and analyse and select suitable underground coal development machinery, underground coal extraction machinery, and underground coal transport, for underground coalmines.
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Classification	Extractive Industries > Extractive Industries Management
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Available grade	Achieved
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Prerequisites	Unit 7146, <i>Demonstrate basic knowledge and ability required to work in an 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;
Health and Safety at Work (Hazardous Substances) Regulations 2017 and related Safe Work Instruments (SWIs) published by WorkSafe NZ;
approved codes of practice issued pursuant to the HSW Act;
Hazardous Substances and New Organisms Act 1996.
- 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 Definition

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).

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

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of geological features of coal measures in relation to underground mining methods.

Performance criteria

1.1 The effects of geological features are described in relation to a given mining method.

Range includes but is not limited to – geological structure, rock properties, sedimentary characteristics, coal properties.

1.2 The properties of the various coal types are described in terms of mining methods.

Outcome 2

Describe support requirements and potential hazards in underground coal mines.

Performance criteria

2.1 Support requirements are described in terms of maintaining stability of the excavation.

Range includes but is not limited to – bolting methods, timber support, steel sets, hydraulic chocks, side support, mesh.

2.2 Hazards that may occur are described in terms of mining safety.

Range includes but is not limited to – gas, dust, hydrocarbons, strata instability, inundations.

Outcome 3

Demonstrate knowledge of underground coal mining development methods.

Performance criteria

- 3.1 Development methods are described in terms of the geological features of the coal seam.
- Range hand mining, drill and blast, mechanical loading, roadheader, continuous miner, hydromonitor, multiple headings, single entry, main headings, section and panel development.
- 3.2 The resultant pressure distribution relating to development roadways is described in terms of effects on the surrounding strata and stability of the roadways.
- 3.3 The hazards resultant from roadway development are described in terms of health and safety of workers and potential damage in the coal mine.

Outcome 4

Analyse and select suitable underground coal development machinery for underground coalmines.

Performance criteria

- 4.1 The geological and mining conditions are analysed in terms of the development machinery required.
- Range geological features and structure, bedded rock, seam thickness, gradient, rock properties, sedimentary strata, strength, hardness, cleat, joints, dip and strike, density, coal seam characteristics, depth, stress distribution, roadway orientation.
- 4.2 The attributes of the machinery are analysed in terms of development methods.
- Range includes but is not limited to – drill and blast, hydromonitors, continuous miners, road headers.
- 4.3 Potential hazards are analysed in relation to the operation of development machinery.
- Range includes but is not limited to – strata stability, gas, dust, hydrocarbons, water, old workings, outbursts.
- 4.4 The characteristics of the plant, site, and hazards are analysed, and plant is selected in terms of end-product requirements, financial constraints, and safety considerations and requirements.

Outcome 5

Demonstrate knowledge of underground coal extraction methods.

Performance criteria

- 5.1 Extraction methods are described in terms of the geological features of the coal seam and mining conditions.
- Range hydromining systems, longwall, panel extraction methods, pillar splitting and lifting, sub-level caving, bottom caving, gallery mining, partial extraction, bottom coaling.
- 5.2 The resultant pressure distribution relating to extraction working places is described in terms of the effects on the surrounding strata and extraction areas.
- Range includes but is not limited to – pillar splits, fenders, goaf, stumps, width to height ratio, pillar stiffness.
- 5.3 The hazards resultant from extraction methods are described in terms of health and safety of workers, and potential damage in the coal mine.
- 5.4 Planning an extraction section in an underground coal mine is described in accordance with industry best practice.
- Range includes but is not limited to – roadway and panel orientation, roadway and extraction dimensions, pillar and panel size, extraction method, surface impacts, subsidence effects.

Outcome 6

Analyse and select suitable underground coal extraction machinery for underground coalmines.

Performance criteria

- 6.1 The geological and mining conditions are analysed in terms of the extraction machinery required.
- Range geological features and structure, bedded rock, seam thickness, gradient, strata, strength, hardness, cleat, joints, dip and strike, coal seam characteristics, depth, stress distribution, abutment loads.
- 6.2 The attributes of the machinery are analysed in terms of coal extraction.
- Range includes but is not limited to – drill and blast, hydromonitor, hydromining pumps and nozzles, continuous miner, longwall.
- 6.3 Potential hazards are analysed in terms of extraction machinery.
- Range includes but is not limited to – strata stability, gas, dust, hydrocarbons, water, old workings, pillar stability.

- 6.4 The characteristics of the plant, site, and hazards are analysed, and plant is selected in terms of end-product requirements, financial constraints, and safety considerations and requirements.

Outcome 7

Analyse and select suitable underground coal transport for underground coalmines.

Performance criteria

- 7.1 The attributes of coal transport are analysed in terms of haul distance, coal quantity, coal characteristics, and nature of the deposit.

Range conveyors, shuttle cars, hydro transport, rail transport, rope haulage, slurry pumping, diesel haulage.

- 7.2 Potential hazards are analysed in terms of coal transport.

Range strata stability, gas, dust, water, spontaneous combustion, pillar stability, fires, blockages, spillages, environment.

- 7.3 The attributes of the plant, site, and hazards are analysed, and plant is selected in terms of end-product requirements, financial constraints, and safety considerations and requirements.

Replacement information	This unit standard replaced unit standard 15668 and unit standard 21823.
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Planned review date	31 December 2022
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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	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 MITO New Zealand Incorporated info@mito.org.nz if you wish to suggest changes to the content of this unit standard.