Australian Government

CPPSIS6033A Conduct underground mine surveying

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

CPPSIS6033A Conduct underground mine surveying

Modification History

Unit revised and not equivalent to CPPSIS6013A Conduct underground mine surveying
Element structure, performance criteria, and critical aspects reviewed to reflect workplace requirements
References to sustainability strengthened
Skills and knowledge requirements and the range statement updated

Unit Descriptor

This unit of competency specifies the outcomes required to work in a surveying capacity in an underground mining environment. It requires knowledge of underground mining operations and the ability to plan and draft mine drawings to meet job specifications. Functions will be carried out within organisational guidelines.

Application of the Unit

This unit of competency supports the application of the planning, organisational, communication, sound problem-solving and accuracy skills; error analysis; designing and interpreting technical documentation; and a high-level understanding of technology. The skills and knowledge acquired upon completion of this unit would support the needs of employees in surveying.

Licensing/Regulatory Information

Licensing, legislative and regulatory requirements for this unit may include the relevant components of state, territory and federal legislation.

Pre-Requisites

Nil

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1	Identify project.	1.1	***Organisational priorities*** are determined to identify project activity.
		1.2	***Project specifications*** are presented to ***relevant personnel***.
2	Organise resources for underground mine surveying operations.	2.1	Processes and procedures involved in undertaking underground mining method, including ***mine access, layout, development and provision of services*** are planned according to ***organisational*** and ***OHS guidelines***.
		2.2	Mining techniques applicable to the ***development of headings in underground mining operations*** are planned according to ***project objectives***.
		2.3	***Underground mining methods*** for metalliferous and coal mines are determined.
		2.4	Levels of ***rock stability and ground support*** requirements are incorporated into the project specifications.
		2.5	***Loading and haulage requirements for underground mines*** are detailed in project specifications.
		2.6	***Mine ventilation requirements*** for underground mines are detailed in project specifications according to OHS guidelines.
		2.7	***Mining regulations*** with regard to management, surveying and ***safety*** are detailed according to relevant

			legislation and ***company policy***.
		2.8	***Equipment*** use is planned according to ***manufacturer specifications***.
3	Manage underground mine surveying operations.	3.1	Project objectives, deliverables, ***constraints***, ***principal work activities*** and equipment requirements are defined and documented according to spatial data specifications and ***client requirements***.
		3.2	Work is scheduled to be completed within ***time available***.
		3.3	***Project management mechanisms*** are implemented to measure, record and report progress of activities in relation to the agreed schedule and plans.
		3.4	Agreed communication processes between project members, ***client*** and other ***stakeholders*** are implemented and maintained.
		3.5	OHS and legislative requirements are incorporated into project ***risk management***.
		3.6	Pertinent ***legal and statutory standards*** are researched, considered and adhered to.
		3.7	***Contingencies*** and constraints are managed to ensure project meets specifications.
4	Conduct operational elements of underground mine surveying operations.	4.1	Identified spatial components of mine design are accurately measured or set out.
		4.2	Measured spatial data is reduced to project reference system.
		4.3	Mine drawings are created to meet job specifications.
		4.4	Captured data is used to calculate mine volumes.
		4.5	Underground development is set out according to design parameters.
		4.6	OHS requirements are adhered to throughout the survey.
		4.7	Measured spatial data is reduced to project reference system for comparison with design.

		4.8 ***Measurements*** are validated and recorded according to project specifications.
		4.9 ***Quality assurance processes*** are implemented based on the project plan.
5	Finalise the project.	5.1 Relevant personnel are informed of the results according to organisational guidelines.
		5.2 ***Required documentation*** is completed according to organisational guidelines.
		5.3 Spatial data is archived according to project specifications.

Required Skills and Knowledge

This section describes the essential skills and knowledge and their level, required for this unit.

Required skills

- communication skills to:
  - consult effectively with clients and colleagues
  - impart knowledge and ideas through oral, written and visual means
- initiative and enterprise skills to:
  - manage information
  - interpret project requirements and translate them into design
- literacy skills to:
  - assess, develop and use workplace information
  - read and write key performance reports, including technical reports
  - research and evaluate to source surveying and spatial information services educational information
- numeracy skills to:
  - analyse errors
  - conduct image analysis
  - estimate costs
  - interpret and analyse statistics
  - perform mental calculations
  - record with accuracy and precision
  - undertake high level computations
- organisational skills to:
  - plan and coordinate technical and human resource inputs to research activities
  - plan and prioritise activities to meet contractual requirements
- project-management skills to:
  - plan underground mine activity
  - coordinate, conduct and monitor activity according to specifications
  - document action taken
- spatial skills to:
  - exercise precision and accuracy in relation to underground mine surveying
  - archive and retrieve spatial data
  - manage and manipulate spatial data
  - manage files
  - solve complex problems relating to height, depth, breadth, dimension, direction

and position in actual operational activity and virtual representation

- technology skills to:
  - use computers to develop surveying documentation
  - use instruments when conducting underground mine surveys

Required knowledge

- abilities of work teams
- accuracy and precision requirements
- data capture and data set out
- calibration of specialised surveying equipment
- concept of mining in terms of the objectives, types, classifications and purpose
- data formats
- data management
- data reduction and manipulation techniques
- development of headings in underground mining operations
- economic significance of mining in terms of domestic and international markets and global technological demands
- engineering-related tasks and associated computations
- guidelines of projects
- industry standards
- legislative, statutory and industry requirements and standards
- limitations of the guidelines relating to equipment, measuring and analysis
- mineral exploration methods: geophysical, geochemical and geological techniques
- mining methods for metalliferous and coal mines
- mining technology revolution
- organisational policies and guidelines, such as OHS guidelines
- phases and stages of exploration procedure and possible methods of exploration relevant to each
- planning and control processes
- processes and procedures involved in undertaking exploration of mineral deposits
- project review procedures
- safe work practices
- scope of mining in terms of cultural, economical and social significance
- spatial reference systems
- surveying equipment for data capture
- surveying reference systems
- terminology and nomenclature applicable to mining

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the Assessment Guidelines for this Training Package.

Overview of assessment

This unit of competency could be assessed on its own or in combination with other units relevant to the job function, for example CPPSIS6021A Conduct open mine pit surveying.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- conducting a collection and validation process based on thorough assessment of all relevant considerations
- accessing and interpreting design information to identify the components to be measured and monitored
- documenting and reporting action taken
- managing contingencies
- performing measurements
- planning resources
- reducing and manipulating spatial data
- recording and reporting non-conformity aspects
- knowledge of underground mining operations.

Specific resources for assessment

Resource implications for assessment include access to:

- assessment instruments, including personal planner and assessment record book
- assignment instructions, work plans and schedules, policy documents and duty statements
- registered training provider of assessment services
- relevant guidelines, regulations and codes of practice
- suitable venue and equipment.

Access must be provided to appropriate learning and assessment support when required.
Where applicable, physical resources should include equipment modified for people with disabilities.

Context of assessment

Holistic: based on the performance criteria, evidence guide, range statement, and required skills and knowledge.

Method of assessment

Demonstrated over a period of time and observed by the assessor (or assessment team working together to conduct the assessment).
Demonstrated competency in a range of situations, that may include customer/workplace interruptions and

involvement in related activities normally experienced in the workplace.
Obtained by observing activities in the field and reviewing induction information. If this is not practicable, observation in realistic simulated environments may be substituted.

Guidance information for assessment

Assessment requires that the clients' objectives and industry expectations are met. If the clients' objectives are narrowly defined or not representative of industry needs, it may be necessary to refer to portfolio case studies of a variety of surveying and spatial information services requirements to assess competency.
Oral questioning or written assessment and hypothetical situations (scenarios) may be used to assess underpinning knowledge (in assessment situations where the candidate is offered a preference between oral questioning or written assessment, questions are to be identical).
Supplementary evidence may be obtained from relevant authenticated correspondence from existing supervisors, team leaders or specialist training staff.
All practical demonstration must adhere to the safety and environmental regulations relevant to each State or Territory.
Where assessment is for the purpose of recognition (recognition of current competencies [RCC] or recognition of prior learning [RPL]), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time.
In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge.
Assessment processes will be appropriate to the language and literacy levels of the candidate and any cultural issues that may affect responses to the questions, and will reflect the requirements of the competency and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording in the performance criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Organisational priorities may include:

- client focus
- external influence and focus
- financial priorities
- internal influence and focus
- operational plan
- strategic plan.

Project specifications may include:	• detailed technical descriptions of survey data and its requirements • preparation of cross-sections and plans with all information included.
Relevant personnel may include:	• colleagues • registered surveyors • company personnel • staff or employee representatives • supervisors or line managers • suppliers.
Mine access, layout, development and provision of services may include:	• factors considered in providing access for underground mining operations • methods for water control, including types of pump in common use • requirements for compressed air • requirements for electric power and lighting • requirements for mine dewatering • requirements for a mine water supply.
Organisational guidelines may include:	• appropriate timelines • code of ethics • company policy • final product formats • formal design parameters • legislation relevant to the work or service function • manuals • OHS policies and procedures • personnel practices and guidelines outlining teamwork, work roles and responsibilities • requirements for data processing.
OHS may include:	• Australian standards • development of site safety plan • identification of potential hazards • inspection of work sites • training staff in OHS requirements • use of personal protective clothing • use of safety equipment and signage.

Development of headings in underground mining operations may include:	• development of underground drives, including:
	  • declines
	  • levels
	  • raises

- shafts.

Project objectives may include:	• agreed client requirements • written survey specifications.

Underground mining methods may include:	• mining methods applicable to underground coal mining, including:
	  • long wall
	  • room
	  • pillar
	• mining methods applicable to underground metalliferous mining, including:
	  • block caving
	  • cut and fill stoping and shrinkage stoping
	  • sub-level caving
	  • sub-level open stoping.

Rock stability and ground support may include:	• principles for rock support in underground operations
	• techniques for providing rock support, including:
	  • cable bolts
	  • rock bolts.

Loading and haulage requirements for underground mines may include:	• application of loading and haulage methods relative to underground mining operations
	• selection and use of equipment and processes used for loading and haulage, including:
	  • conveyor and skip requirement for gradient
	  • dump trucks
	  • loading stations
	  • minimum radius and clearance for truck haulage
	  • ore passes.

Mine ventilation requirements may include:	• duties of the ventilation officer for an underground mining operation • exposure standards for atmospheric contaminants • methods for measuring air velocity and determining air quantity given relevant operational data • properties of natural air flow • methods of mechanical and auxiliary ventilation • requirements for ventilation plans • sources of atmospheric contaminants in an underground mining environment • testing and sampling of atmospheric contaminants.
Mining regulations may include:	• Australian standards • coal mining Acts and regulations • environmental agency regulations • isolation procedures

- manufacturer specifications and recommendations
- other applicable legislation, including:
  - electricity and gas
  - radiation
  - mine.

Safety requirements may include:	• major safety risks associated with underground mining
	• mine safety regulations relating to:
	  • safety and ventilation of a mining operation
	  • surveying
	  • requirement for mine rescue procedures, including mine rescue plans.

Legislation may include:	• Australian standards • award and enterprise agreements • certification requirements • codes of practice • environment protection legislation • OHS legislation • quality assurance requirements.
Company policy may include:	• company OHS standards • customer service standards • company goals, such as mission statement • governance guidelines • guidelines on the use of equipment • internal and external communication guidelines • operational manuals • operational plan • strategic plan.
Equipment may include:	• augers and drills • bucketwheel • draglines • equipment, such as trailers and floats • excavators • four-wheel drive passenger vehicles • high well miners • laser technologies • scrapers • water and service machines.
Manufacturer specifications may include:	• equipment specifications • operator manuals.
Constraints may include:	• coverage • datum • environmental factors • industry requirements • legal and statutory • financial

- resource availability
- time.

Principal work activities may include:	• activity and sequence of activity determined to be essential in order to meet project objectives.
Client requirements refer to description of outputs and may be contained in:	• contracts • memos • tender briefs • verbal instructions • written instructions.
Time available may involve estimates for time duration of project, including:	• client instructions • consideration of contingencies • consideration of past project experiences • experience of project personnel • location of project • methods to be employed • resources and equipment to be used.
Project management mechanisms may include:	• communication with stakeholders • dispute resolution guidelines • monitoring and adjusting key milestones.

Client may include:	• customers with routine or special requests
	• external to organisation
	• internal to organisation
	• regular and new customers, including:
	  • business enterprises
	  • government agencies
	  • members of the public
	  • suppliers.

Stakeholders may include:	• human resource personnel: internal or external • procurement agency: internal or external management.
Risk management may include:	• adhering to budget • anticipating external influences • contingency planning • guidelines for the selection of contractors • effective communication and consultation • effective project management • internal and external audit processes • milestone review and evaluation • realistic timelines • targeted activity.
Legal and statutory standards may include:	• local government requirements • national standards • state statutes and regulations.

Contingencies may include:	• environmental issues • equipment failure • injury to personnel • personnel turnover • observation errors • obstructions • weather.
Measurements may include use of:	• current meter • echo sounder • global navigation satellite system (GNSS) • level • remote sensing • tape • tide gauge • total station.
Quality assurance processes may include:	• internal and external • monitoring activity against set targets • product or service measurement against set criteria • standard verification.
Required documentation may include:	• electronic or paper-based correspondence with client • field records • final report • records of conversation • survey plots • organisational work activity sheets.

Unit Sector(s)

Surveying and spatial information services

Custom Content Section

Not applicable.