



Australian Government

Department of Education, Employment and Workplace Relations

UETTDRSO45A Operate and monitor system SCADA equipment

Release: 1

UETTDRSO45A Operate and monitor system SCADA equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the skills and knowledge to operate, monitor and control HV apparatus on the network via SCADA control

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UETTDREL15A	Respond to power systems technical enquiries and requests

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5
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Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6)** Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare for the operation, monitoring and control of system equipment	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined.
	1.2 System requirements are established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 System and associated equipment operational prerequisites are identified and established in accordance with manufacturers and/or enterprise/site procedures
	1.4 System monitoring and control procedures are discussed with and/or directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Operational parameters are ascertained from established policies, procedures and specifications.
	1.6 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.7 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.8 Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.

ELEMENT	PERFORMANCE CRITERIA
	1.9 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.10 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out and coordinate the operation, monitoring and control of system equipment	2.1 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.2 Decisions concerning the operation, monitoring and control of system equipment are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.3 The effectiveness of the finished project is analysed as per requirements and established procedures.
	2.4 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.6 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.7 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.8 Quality of work is monitored against personal performance agreement and/or established

ELEMENT**PERFORMANCE CRITERIA**

organisational and professional standards.

3 Complete the operation, monitoring and control of system equipment

3.1

Final review of the operation, monitoring and control of system equipment is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project.

3.2

Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.

3.3

Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO45A SCADA system equipment - operation and monitoring

Evidence shall show an understanding of SCADA system equipment - operation and monitoring to an extent indicated by the following aspects:

T1 Supervisory control and data acquisition systems encompassing:

- SCADA system features and applications - industries in which SCADA systems are used, associate benefits of the package, features and facilities of different SCADA packages, hardware requirements.
- Reading mimics and animated graphics
- Trending - analysis of process to select data, viewing data and graphical representation of selected information, trend graphs and data matching.
- Alarm logging - analysing select data, corrective action of alarm status

T2 Personal computer operating systems encompassing:

- Basic function, components and concepts
- Operating systems in use
- System installation and configuration

T3 Computers applications encompassing:

- Application software types
- Configurations and preferences
- Use of particular software packages - word processor, spreadsheet, database, presentation software, web/document publisher, CAD/drawing packages, email client, business management.

T4 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and

REQUIRED SKILLS AND KNOWLEDGE

distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T5 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T6 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T7 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution

REQUIRED SKILLS AND KNOWLEDGE

substation, street lighting system.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform on at least three (3) occasions the following:	Evidence of switching programs involving the operation and monitoring of system equipment via SCADA
B	Perform on at least two (2) occasions the following:	Evidence of unplanned switching events involving the operation and monitoring of system equipment via SCADA
C	Demonstrate the following:	Extract data used in the analysis of network loading trends
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual preparation of the monitoring, control and operation of system equipment

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the operation, monitoring and control of system equipment include the following:

Equipment shall include network primary and secondary plant types applicable to the enterprise. This may include machines, circuit breakers, tap changers, protection settings, capacitor/condenser banks, switch gear, generators and transformers.

Safety standards may include relevant sections of Occupational Health and Safety legislation, enterprise safety rules, relevant state and federal legislation, national standards for plant and environmental legislation.

Information and documentation sources may include verbal or written communications; enterprise safety rules documentation; enterprise operating instructions; dedicated computer equipment; enterprise/site standing and operating instructions; enterprise log books; manufacturer's operation and maintenance manuals; and equipment and alarm manuals.

Technical and operational indicators may include stimuli, local indicators and recorders, computers and alarms (visible and or audible).

Communications may be by means of telephone, two way radio, pager, public address system, computer (electronic mail) and operating log (written or verbal).

Appropriate personnel to consult, give or receive direction may include supervisor/team leader or equivalent, power plant operations personnel or equivalent, technical and engineering officers or equivalent, maintenance staff, other operating staff or equivalent, system controller/network controller, field operator and restricted HV operators.

Operations may be continuous operation or during inclement or otherwise harsh weather conditions or during night periods.

Faults and abnormal operating conditions may include control equipment failure/malfunctions/ parameters out of specification, loss of electrical supply to plant and equipment, loss of transmission components, system limitations due to location, weather conditions, natural disasters, accidents, temperature and power swings.

Key indicators may include voltage, current, reactive power flows, load, equipment loading limits and system node points.

Voltage control may include synchronous compensatory, generation VAR output, capacitor/condenser, tap changers and system configuration.

System integrity may include machine and system instability, transmission line and transformer overloading, incorrect tap changer position, protection settings, voltage transformer selection, synchronising, required load shedding and capacitor/condenser bank selection.

RANGE STATEMENT

Operational prerequisites may include switching programmes, pre-operational checks and plant status.

Regulatory and enterprise procedures for the compliance with national electricity code.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

System Operation Units