



Australian Government

UETTD RDS48 Analyse and appraise power system fault and outage data

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Application

This unit covers the data gathering and analysis of system outages and plant failures. It includes recommending solutions and maintenance plans to ensure system security.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace subject to regulations for undertaking of electrical work.

Other conditions may apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTD RDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTD RDS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTD RDS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Design

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Plan for and coordinate the analysis and appraisal of fault and outage data

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the analysis and appraisal of fault and outage data, are reviewed and determined
- 1.2** Purpose of the analysis/appraisal is established and expected outcomes of the work are confirmed with appropriate personnel
- 1.3** Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
- 1.4** Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
- 1.5** Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
- 1.6** Risk control measures are identified, prioritised and evaluated against the work schedule
- 1.7** Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
- 1.8** Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

- coordinated and confirmed safe and in technical working order
- 1.9** Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
 - 1.10** Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
 - 1.11** Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
 - 1.12** Positioning of road signs, barriers and warning devices is planned in accordance with requirements
- 2 Carry out and coordinate the analysis and appraisal of fault and outage data**
- 2.1** Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
 - 2.2** WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
 - 2.3** Analysis/appraisal decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
 - 2.4** Mathematical models of solutions for system outages and plant failures are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
 - 2.5** Technical advice is given to 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
 - 2.6** 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

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| | 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 organisational and professional standards |
| 3 Complete and coordinate the analysis and appraisal of fault and outage data | 3.1 | Final inspections of the analysis/appraisal are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief |
| | 3.2 | Appropriate personnel are notified of completion and reports and/or completion documents are finalised |
| | 3.3 | Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval |
| | 3.4 | Approved copies of documents are issued and records are updated in accordance with established procedures |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS48A Analyse and appraise power system fault and outage data.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7>

Assessment Requirements for UETTDRDS48 Analyse and appraise power system fault and outage data

Modification History

Release 1. This is the first release of this unit of competency in the UET Transmission, Distribution and Rail Sector Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate occasions and include:

- applying relevant work health and safety (WHS/occupational health and safety (OHS) requirements, including the use of risk control measures
- applying sustainable energy principles and practices
- writing reports relating to each of the following, recommending relevant actions:
 - zone substation faults
 - distribution feeder faults
 - distribution substation faults
- dealing with unplanned events on at least one (1) occasion.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- principles of high voltage (HV) encompassing:
 - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on or near HV
 - electrical and electrostatic principles related to high voltage lines - relationship of current, voltage and resistance as related to transmission lines and relationship of phase voltage and respective line voltages, and production of an electric field encompassing:
 - units, effect of distance, potential of an object within the field and the effect of distances to the potential
 - HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system, determining the minimum allowable number of discs per string for each line voltage in the system before bare-hand work is to proceed, techniques in detecting a failed disc in a string, techniques in using appropriate tools and equipment to test a string and methods of recording data
 - effects of electrostatic induction on the human body - relationship of the resistance of a

- human body to different levels of current and voltage, relationship of a human body to an electric field and effects of electrostatic induction on bare-hand work
- application of Faraday's cage - effects of a body, advantages and description of the Faraday's cage used by bare-hand live-line workers
 - safety precautions working on or near HV electrical apparatus - safe approach distances from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised live working equipment; safe working policies, procedures and practices when using and operating specialised equipment; methods of using specialised equipment and emergency response and rescue, including first aid
 - effects of lighting and switching surges on performance of string insulators - health effects to workers and methods used to alleviate surges on transmission lines
 - magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields
 - electrical equipment associated with protection and control schemes encompassing:
 - types and applications of electrical equipment encompassing characteristics and capabilities - schemes, overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker (CB) fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault
 - installation of switchgear and associated equipment encompassing:
 - types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, and earthing requirements and techniques
 - types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
 - installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and/or enterprise requirements; assembly and erecting procedures; earthing requirements and techniques and pole mounted locations
 - maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
 - testing and commissioning - ESI standards and procedures
 - low voltage (LV) switching principles encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of LV to a given schedule
 - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and LV network interconnectors source of possible back-feed
 - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permits, operational procedures and

- earthing procedures
- personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
 - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching of HV to a given schedule
 - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus; use, characteristics and capabilities of specialised tools and testing equipment; and network interconnectors source of possible back-feed
 - role of the HV switching operator
 - operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
 - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc strangles
 - types and categories of HV switchgear
 - application, function and operating capabilities of switchgear
 - restrictions pertaining to HV switching equipment
 - procedures for the isolation of HV transmission main and working earths
 - earthing HV electrical apparatus practices and procedures for access - purposes of operational and additional work part on-site earths, factors determining the location and effectiveness of operational earthing, acceptable industry procedures and (PPE
 - HV switching techniques
 - operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- HV fault switching principles encompassing:
 - primary causes, effects and types of HV electrical faults
 - HV protection devices - main components, types, categories, applications and functions
 - basic principle of operation of HV system protection devices
 - protection coordination and protection zoning
 - HV feeder auto-reclosing suppression - function and application
 - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- HV distribution transformer principles encompassing:
 - operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer - cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
 - HV underground switching equipment - arc strangles, switch operation, load break

- elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers
- feeder automation system encompassing:
 - function of feeder automation system and the main components
 - operation procedure for a remote field device from a local control station
 - functions of supervisory control and data acquisition (SCADA) (or any other relevant data acquisition and control) systems and its main components
 - SCADA system security interlocks and access restrictions
 - SCADA system operation when switching apparatus or retrieving data via a remote access device, such as remote access terminal (RAT), dial up voice annunciated system and local control station
 - function of the main components of a local/remote control system
 - operation of a field devices using SCADA systems via a RAT, dial up annunciated system and local control station
- methodology in analysing network event records encompassing:
 - Commonwealth, state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the analysis of critical events
 - requirements for the use of critical event data, manuals, system diagrams/plans and drawings
 - sources of critical event data
 - analysis and assessment of network event records and relevant data- the use of event records and data to analyse and develop optimal network restoration strategies taking into account public and employee safety, enterprise reliability guidelines and resource availability
 - safety policies, procedures and precautions related to critical events - WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; checking integrity of the system for minimum disruption; effective communication methods and chain of command; and emergency response and rescue, including first aid procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated conditions involving realistic and authentic activities that replicate operational workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and PPE currently used in industry to perform analysis and appraisal of fault and outage data
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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