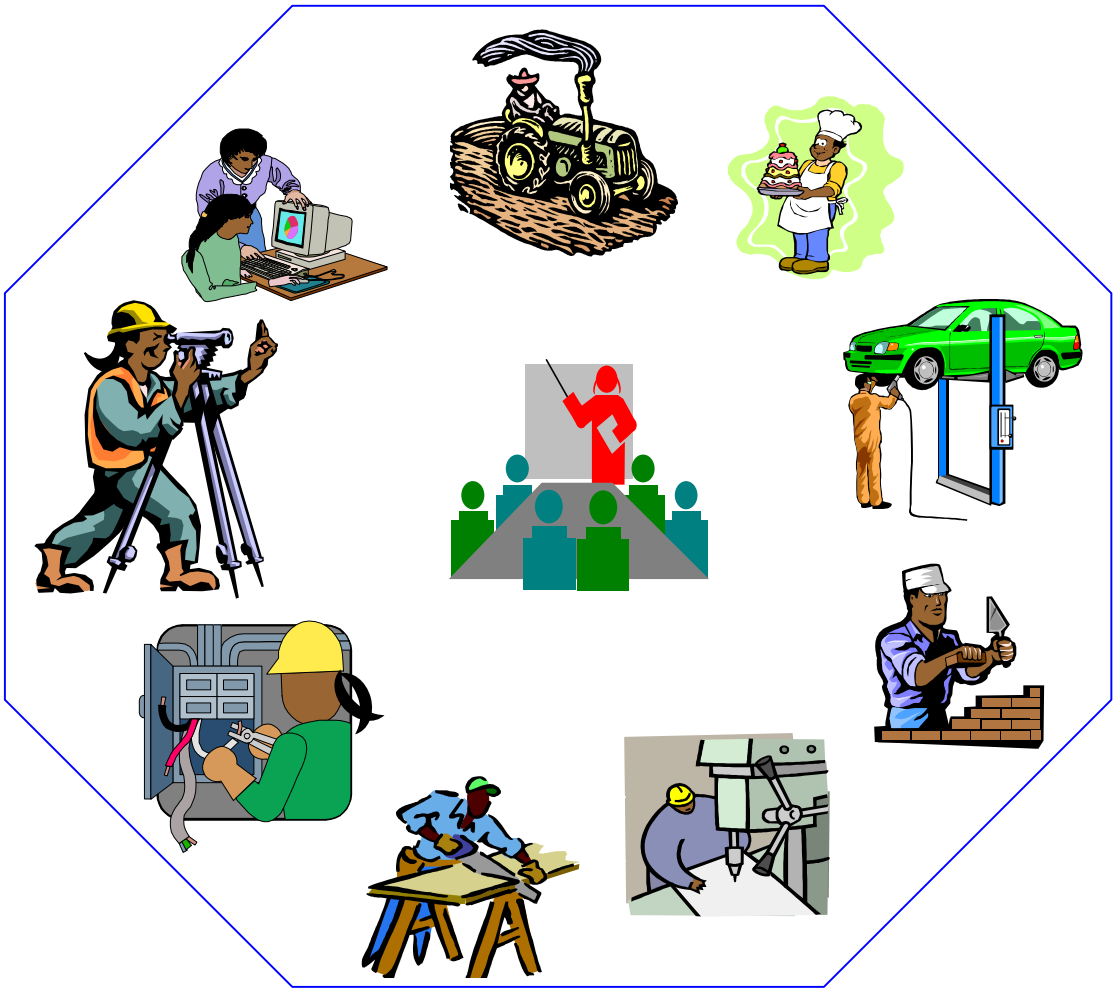
Federal Democratic Republic of Ethiopia

OCCUPATIONAL STANDARD

POWER SYSTEM OPERATION MANAGEMENT

NTQF Level V



Ministry of Education

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Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standards (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF). They are national Ethiopian standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title and NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance criteria
- Variables and Range statement
- Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit of Competence:

- chart with an overview of all Units of Competence for the respective level (Unit of Competence Chart) including the Unit Codes and the Unit Titles
- contents of each Unit of Competence (competence standard)
- occupational map providing the technical and vocational education and training (TVET) providers with information and important requirements to consider when designing training programs for this standards and for the individual, a career path

UNIT OF COMPETENCE CHART

Occupational Standard: Power System Operation Management

Occupational Code: EIS PSM

NTQF Level V

EIS PSM5 01 0612 Maintain Quality System within the Team	EIS PSM5 02 0612 Manage Occupational Health and Safety Policy and Procedures	EIS PSM5 03 0612 Manage Critical Incidents
EIS PSM5 04 0612 Perform Cost Estimations	EIS PSM5 05 0612 Manage First Response Team Operation	EIS PSM5 06 0612 Manage and Coordinate Permit to Work System
EIS PSM5 07 0612 Manage the Network/System	EIS PSM5 08 0612 Manage System Restart	EIS PSM5 09 0612 Design and Develop Text Documents
EIS PSM5 10 0612 Investigate Quality of Supply Issues	EIS PSM5 11 0612 Coordinate and Direct Switching Program	EIS PSM5 12 0612 Plan Scheduled Outage
EIS PSM5 13 0612 Manage Operational Crisis to Maintain/ Restore Power System Integrity	EIS PSM5 14 0612 Conduct Project Management	EIS PSM5 15 0612 Deliver and Monitor Service to Customers
EIS PSM5 16 0612 Manage Commissioning/ Decommissioning	EIS PSM5 17 0612 Manage Quality Systems and Procedures	EIS PSM5 18 0612 Provide Leadership in the Workplace
EIS PSM5 19 0612 Ensure Team Effectiveness	EIS PSM5 20 0612 Facilitate Continuous Improvement	EIS PSM5 21 0612 Manage Workplace Information System
EIS PSM5 22 0612 Facilitate and Capitalize on Change and Innovation	EIS PSM5 23 0612 Manage Project Quality	EIS PSM5 24 0612 Establish and Conduct Business Relationships
EIS PSM5 25 1012 Develop and Refine Systems for Continuous Improvement in Operations		

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Maintain Quality System within the Team**
Unit Code	**EIS_PSM5 01 0612**
Unit Descriptor	This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Elements	Performance Criteria
1. Formulate team aspects of the quality system	1.1 Team quality assurance requirements/targets are identified or modified from an analysis of enterprise needs 1.2 Team performance indicators, identified during team consultations, are agreed or referred to the appropriate party for approval in accordance with job requirements 1.3 Compatibility between total team and total individual performance indicators is effectively co-ordinated in accordance with job requirements 1.4 Site and team quality systems documentation is obtained, edited and summarised as required and made available to all members in accordance with job requirements 1.5 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2. Facilitate team quality systems	2.1 Team members are provided with encouragement and training in team quality systems matters in accordance with job requirements 2.2 The application of quality systems is monitored regularly both in the workplace and with customers in accordance with job requirements 2.3 Instances of inability to satisfy key performance indicators are recorded, investigated and referred to team mechanisms and appropriate authorities for remedial actions in accordance with enterprise procedures 2.4 Quality systems are regularly reviewed with the team to ensure their currency and continuing relevance in accordance with enterprise procedures 2.5 Team quality systems records are maintained and made available to interest parties in accordance with enterprise procedures

Variable	Range
Work may be affected by:	• Relevant standards • Occupational Health and Safety standards • Codes of practice • Manufacturer specifications • Environmental requirements and • Enterprise procedures

Evidence Guide	

Critical aspects of Competence	Assessment requires evidence that the candidate able to:
	• Implement Occupational Health and Safety workplace
	• procedures and practices including the use of risk control
	• measures
	• Apply sustainable energy principles and practices
	• Demonstrate performance across a representative range of contexts from the prescribed items below:
	  • Knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
	  • Ethiopian and/or international standards related to quality
	  • Monitoring and reviewing quality systems
	  • Maintaining records and documentation

Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • International standards related to quality • Ethiopian standards related to quality (if any) • Quality management theory • Team quality systems and procedures including: • responsibilities and prerogatives, • documentation system including quality manual and • quality plan, • quality records processes, • performance and achievement audits, • Elementary quality systems design processes • Communication procedures
Underpinning Skills	Demonstrates skills to: • Access, interpret and apply enterprise quality systems procedures and practices • Formulate elementary quality systems • Formulate quality practices for the team operations • Establish quality performance indicators for teams and site work • Conduct and analyze the results of quality systems audits • Co-ordinate the development and maintenance of team competence in quality systems

	• Co-ordinate the modification of team systems based on quality systems findings • Communicate effectively • Apply data analysis techniques and tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. In addition to the resources listed above in Context of assessment', evidence should show competence working, in limited spaces, with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Manage Occupational Health and Safety Policy and Procedures**
Unit Code	**EIS PSM5 02 0612**
Unit Descriptor	This unit deals with the skills and knowledge required to establish and evaluate the organization's Occupational Health and Safety system in order to ensure that the workplace is, so far as is practicable, safe and without risks to the health of employees.

Elements	Performance Criteria
1. Establish and maintain the framework for the Occupational Health and Safety system in the area of responsibility	1.1 ***Occupational Health and Safety policies*** are developed which clearly express the organisation's commitment to Occupational Health and Safety within the area of managerial responsibility and how relevant Occupational Health and Safety legislation will be implemented, consistent with overall organisational policies 1.2 Occupational Health and Safety responsibilities and duties which will allow implementation and integration of the occupational health and safety system are clearly defined, allocated and included in job descriptions and duty statements for all relevant positions 1.3 Financial and human resources for the operation of the occupational health and safety system are identified, sought and/or provided in a timely and consistent manner 1.4 Information on the occupational health and safety system and procedures for the area of responsibility is provided and explained in a form which is readily accessible to employees 1.5 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of on-the-job training
2. Establish and maintain participative arrangements for the management of Occupational Health and Safety	2.1 Appropriate ***consultative processes*** are established and maintained in consultation with employees and their representatives in accordance with relevant Occupational Health and Safety legislation and consistent with the organisation's overall process for consultation 2.2 Issues raised through participation and consultation are dealt with and resolved promptly and effectively in accordance with procedures for issue resolution 2.3 Information about the outcomes of participation and consultation is provided in a manner accessible to employees

3. Establish and maintain procedures for identifying hazards	3.1 Existing and potential hazards within the area of managerial responsibility are correctly identified, and identification confirmed in accordance with occupational health and safety legislation, codes of practice and trends identified from the OHS records system 3.2 A procedure for ongoing identification of hazards is developed and integrated within systems of work and procedures 3.3 Activities are appropriately monitored to ensure that this procedure is adopted effectively throughout the area of managerial responsibility 3.4 ***Hazard*** identification is addressed at the planning, design and evaluation stages of any change in the workplace to ensure that new hazards are not created
4. Establish and maintain procedures for assessing risks	4.1 Risks presented by identified hazards are correctly assessed in accordance with occupational health and safety legislation and codes of practice 4.2 Risk assessment is addressed at the planning, design and evaluation stages of any change within the area of managerial responsibility to ensure that the risk from hazards is not increased 4.3 Activities are monitored to ensure that this procedure is adopted effectively throughout the area of managerial responsibility 4.4 A procedure for ongoing assessment of risks is developed and integrated within systems of work and procedures
5. Establish and maintain procedures for controlling risks	5.1 Measures to control assessed risks are developed and implemented in accordance with the hierarchy of control, relevant occupational health and safety legislation, codes of practice and trends identified from the occupational health and safety record system 5.2 When measures which control a risk at its source are not immediately practicable, interim solutions are implemented until a permanent control measure is developed 5.3 A procedure for ongoing control risks, based on the hierarchy of control, is developed and integrated within general systems of work and procedures 5.4 Activities are monitored to ensure that the risk control procedure is adopted effectively throughout the area of managerial responsibility 5.5 Risk control is addressed at the planning, design and evaluation stages of any change within the area of managerial responsibility to ensure that adequate risk

	control measures are included 5.6 Inadequacies in existing risk control measures are identified in accordance with the hierarchy of control and resources enabling implementation of new measures are sought and/or provided according to appropriate procedures
6. Establish and maintain organizational procedures for dealing with hazardous events	6.1 Potential hazardous events are correctly identified 6.2 Procedures which would control the risks associated with hazardous events and meet any legislative requirements as a minimum are developed in consultation with appropriate emergency services 6.3 Appropriate information and training is provided to all employees to enable implementation of the correct procedures in all relevant circumstances
7. Establish and maintain an Occupational Health and Safety training program	7.1 An occupational health and safety training program is developed and implemented to identify and fulfil employees' Occupational Health and Safety training needs as part of the organisation's general training program
8. Establish and maintain a system for Occupational Health and Safety records	8.1 A system for keeping occupational health and safety records is established and ***monitored*** to allow identification of patterns of occupational injury and disease within the area of managerial responsibility
9. Evaluate the organization's Occupational Health and Safety system and related policies, procedures and programs	9.1 The effectiveness of the Occupational Health and Safety system and related policies, procedures and programs is assessed according to the organisation's aims with respect to Occupational Health and Safety 9.2 Improvements to the Occupational Health and Safety system are developed and implemented to ensure more effective achievement of the organisation's aims with respect to Occupational Health and Safety 9.3 Compliance with Occupational Health and Safety legislation and codes of practice is assessed to ensure that legal Occupational Health and Safety standards are maintained as a minimum

Variable	Range
Involves application of relevant Occupational Health and Safety legislation and codes of practice, particularly:	• general duty of care • requirements for the maintenance of records of occupational injury and disease • provision of information and training • those dealing with Occupational Health and Safety committees • health and safety representatives and issue resolution
Processes for consultation include:	• Occupational Health and Safety committees • consultation with health and safety representatives • issuing resolution procedures and • participative/consultative procedures conducted by supervisory staff within the area of managerial responsibility
Monitoring of activities may include:	• review of written reports • performance appraisal or • auditing procedures

Hazardous events include:	• accidents,
	• fires and
	• Emergencies such as chemical spills or bomb scares. Procedures for dealing with them include:
	  • evacuation,
	  • chemical containment and
	  • first aid procedures

Evidence Guide	
Critical aspects of Competence	Assessment requires evidence that the candidate able to: • Implement OHS workplace procedures and practices including the use of risk control measures • Apply sustainable energy principles and practices • Demonstrate performance across a representative range of contexts from the prescribed items below: • Evidence of detailed knowledge of all relevant OHS legislation and codes of practice and how they will be implemented within the area of responsibility is required • Evidence of understanding of the hierarchy of control (the preferred order or risk control measures from most to least preferred, that is, elimination, engineering controls, administrative controls and lastly, personal protective equipment) is required • Evidence of understanding of the significance of equal employment opportunity principles and practices for Occupational Health and Safety is required • Evidence of understanding of the significance of other management systems and procedures for Occupational Health and Safety is required

Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant Occupational Health and Safety regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures including identification of hazards and controlling of risks • Enterprise /site emergency procedures and techniques • Environmental legislation • Plant status • Enterprise participative arrangements for Occupational Health and Safety • Provision of Occupational Health and Safety training • Maintenance of Occupational Health and Safety records
Underpinning Skills	Demonstrates skills to: • Apply relevant Occupational Health and Safety regulations • Apply relevant statutory legislation • Apply relevant enterprise/site safety procedures • Apply enterprise /site emergency procedures and techniques • Apply enterprise recording procedures • Locate and/or identify relevant plant and equipment • Identify plant status • Communicate effectively. • Management / supervision of staff
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. In addition to the resources listed above in Context of assessment', evidence should show competence working, in limited spaces, with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Manage Critical Incidents**
Unit Code	**EIS_PSM5 03 0612**
Unit Descriptor	This unit refers to the management of incidents of a critical nature that may impact on the operational effectiveness of the plant or system, endanger human life or property, or have an adverse impact on the environment.

Elements	Performance Criteria
1. Identify critical incident and consequences	1.1 Critical incidents and probable implications are identified and assessed in accordance with enterprise procedures 1.2 Secondary threats to situation are identified and monitored in accordance with enterprise procedures 1.3 Data is evaluated in accordance with enterprise procedures to determine probable causes, consequences and potential responses 1.4 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training.
2. Establish contingency plan	2.1 Contingency plans are identified using relevant enterprise ***documentation*** and procedures 2.2 Requirements for additional resources are identified in accordance with enterprise procedures 2.3 Alternate contingencies to cater for crisis variations are developed in consultation with team members
3. Establish communications	3.1 ***Communication*** links with appropriate external authorities for coordination of their resources are established in accordance with enterprise procedures 3.2 Communication with appropriate ***key stakeholders*** is established to disseminate information in accordance with enterprise procedures 3.3 Team roles, both internal and external, are identified and conveyed to appropriate personnel in accordance with enterprise procedures
4. Manage critical incident	4.1 Response is managed in accordance with enterprise/site requirements and allowances for personnel/equipment limitations are made 4.2 Events and responses are prioritized taking into account needs of stakeholders in accordance with enterprise procedures 4.3 Impact of secondary threats are identified and assessed in

	accordance with enterprise procedures 4.4 Contingency plans are implemented in accordance with enterprise/site policy and procedure 4.5 Additional resources are coordinated and directed in accordance with enterprise procedures 4.6 Restoration strategies are monitored, evaluated and adjusted as necessary in accordance with enterprise procedures
5. Document and review incident and response	5.1 Equipment failure/problems are recorded and processed in accordance with enterprise procedures 5.2 Feedback from stakeholders is recorded where necessary and analyzed in accordance with enterprise procedures 5.3 Required reports and findings are generated and distributed to appropriate personnel in accordance with enterprise procedures 5.4 Improvements to the critical ***incident*** management process are recommended to the appropriate parties in accordance with enterprise procedures 5.5 Alternative contingencies are analyzed and recommendations are communicated to ***appropriate personnel*** in accordance with enterprise procedures

Variable	**Range**
Documentation may include:	• policy and procedure • contingency plans • standard operating instructions • emergency switching programs
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
Communications may be by means of:	• telephone • two way radio • pager • computer (electronic mail) and • operating logs (written or verbal)
Liaison with key stakeholders may be:	• system/network controllers/coordinators • oncoming shift change • field operators • support staff • other government bodies • co-generation authorities • generation plant operators • on call staff • police

	• asset centers • patrolmen • customers • fire and emergency services • private systems
Types of incident may include:	• localized blackout • interconnected/isolated power system potential power system threat • accidents • life threatening situations • generation plant and auxiliary plant faults/failure and • loss of network and generation components • natural and environmental disasters
Post incident debrief may be:	• probable fault/failure cause • strategic/contingency plan • environmental implications • economic factors • policy • procedure • training • safety factors and emergency switching programs
Appropriate personnel, team members/other authorities 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 • field operators • restricted operators • emergency personnel • network controllers/coordinators • generation controllers • plant operators and field operators • support staff • fire service • police • ambulance • emergency services • enterprise and site representatives • consumers and independent power producers

Evidence Guide	
Critical aspects of Competence	Assessment requires evidence that the candidate: • Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures • Apply sustainable energy principles and practices • Demonstrated performance across a representative range

	of contexts from the prescribed items below: • The knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures • Knowledge of emergency procedures • Knowledge of the rolls of external authorities/bodies • Ability to establish and manage emergency situations • Ability to tactical decision making techniques • Policies for system incident and follow up procedures
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant Occupational Health and Safety regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures • Enterprise/site emergency procedures and techniques • Plant status • Relevant plant and equipment, it's locations and • operating parameters • Enterprise recording procedures • System/network characteristics • Contingency plans • Supervisory, alarm, protection and control equipment • Switchgear operation • Load shedding principles • Communication principles • Control and data acquisition systems • Computers and software • Switching practices and procedures
Underpinning Skills	Demonstrates skills to: • Apply relevant Occupational Health and Safety regulations • Apply relevant statutory legislation • Apply relevant enterprise/site safety procedures • Apply enterprise/site emergency procedures and techniques • Apply enterprise recording procedures • Manager and control system/network • Identify plant status • Communicate effectively • Apply data analysis techniques and tools • Identify and respond to abnormal system operating conditions • Plan and prioritize work • Coordinate the operation of system/network to maintain plant integrity, personnel safety, continuity of supply and optimum efficiency • Use diagrams, drawings and symbols • Apply stress management techniques

	• Direct and coordinate personnel • Select appropriate load shedding • Apply diagnostic techniques
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. In addition to the resources listed above in Context of assessment, evidence should show competence working in limited spaces with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Perform Cost Estimations**
Unit Code	**EIS_PSM5 04 0612**
Unit Descriptor	This unit deals with the skills and knowledge required to perform cost estimations for planned and forced plant outages (plant may be a single item or whole unit).

Elements	**Performance Criteria**
1. Plan and prepare work details	1.1 Work plan and methods are obtained including preparation and re-commissioning 1.2 Time frame of work is established including required working patterns 1.3 Details of materials, equipment, specialist services and contractual provisions are obtained 1.4 Any specific disposal requirements are identified 1.5 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2. Identify costs	2.1 ***Costs*** associated with the outage are identified in accordance with appropriate procedures 2.2 Penalty and transfer costs associated with the outage are determined and minimised
3. Identify causes and options	3.1 Potential causes of time frame over runs are identified 3.2 Potential variations in work scope are identified and options considered
4. Complete documentation	4.1 Final costs are ***documented*** and produced in accordance with appropriate procedures

Variable	**Range**

Costs may include:	• labor
	• spares
	• specialist services
	• disposal of waste and contractual costs
	• various options are:
	  • schedule of rates
	  • period of quote validity and
	  • variations from original specification detailed

Costed work may be in accordance with the following	• Occupational Health and Safety • quality assurance standards • environmental

legislation:	• enterprise/site standards and • agreements
Documentation may include:	• drawings • material lists • maintenance methods and plans • spare parts information • specifications and quotes

Evidence Guide	

Critical aspects of Competence	Assessment requires evidence that the candidate:
	• Implement Occupational Health and Safety workplace
	• procedures and practices including the use of risk control
	• measures
	• Apply sustainable energy principles and practices
	• Demonstrated performance across a representative range of contexts from the prescribed items below:
	  • The knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
	  • Costing and quotation techniques and procedures
	  • Employment awards and agreements
	  • Penalty and transfer pricing procedures and systems
	  • Data analysis

Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant Occupational Health and Safety regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures • Enterprise/site emergency procedures and techniques • Enterprise recording procedures • Environmental awareness and procedures • Relevant plant and equipment • Costing and quotation techniques and procedures • Employment awards and agreements • Penalty and transfer pricing procedures and systems • Communication principles
Underpinning Skills	Demonstrates skills to: • Apply relevant Occupational Health and Safety regulations • Apply relevant statutory legislation • Apply relevant enterprise/site safety procedures • Apply enterprise/site emergency procedures and techniques • Apply enterprise recording procedures • Use drawings • Communicate effectively • Apply data analysis techniques and tools

	• Compile data • Identify cause and consequence of potential cost excursions • Produce quotations • Produce cost options
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. In addition to the resources listed above in Context of assessment', evidence should show competence working in limited spaces with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Manage First Response Team Operation**
Unit Code	**EIS PSM5 05 0612**
Unit Descriptor	This unit deals with the skills and knowledge required to manage the operation of a response team. It covers the development, implementation and review of the procedures for the operation of the first response team.

Elements	**Performance Criteria**
1. Plan for the operation of the first response team	1.1 The purpose of the response team is identified and, where necessary, clarified with relevant people or organizations 1.2 Requirements for the development of new procedures are identified and confirmed as required 1.3 Consultation with all key internal and external stakeholders to determine whether contingency plans require review is carried out in accordance with enterprise policy 1.4 The roles and responsibilities of emergency service(s) personnel are clarified, and where necessary conveyed to others. 1.5 Team members are identified and supported in relation to duties and responsibilities 1.6 Directions and ***advice*** are given to ***emergency*** service personnel and team members after appropriate site inspection
2. Develop the first response team operational procedures	2.1 Instructions from relevant emergency services personnel are clarified and complied with 2.2 Procedures are researched, created, assessed and confirmed with the ***appropriate personnel*** 2.3 Procedures are planned and developed in accordance with statutory, enterprise/***site*** requirements 2.4 Resources are identified, obtained and utilized for development of the response team 2.5 Procedures are documented and approved in accordance with statutory and enterprise procedures 2.6 A plan to ensure personnel ***safety*** and plant integrity is developed in accordance
3. Manage the operation of the first response	3.1 ***Incidents*** are investigated, assessed and evaluated to prevent repetition of risk

team	3.2 Results and recommendations relating to incident investigations are documented and confirmed with the appropriate ***personnel*** and in accordance with enterprise procedures 3.3 Guidance and ***assistance*** for emergency services is provided in accordance with enterprise/site procedures 3.4 Materials, equipment and r***esources*** required to satisfy the job are identified obtained and assessed 3.5 De-briefing is conducted and findings are responded to in accordance with procedures
4. Review the operation of the first response team	4.1 ***Incident*** response is audited, and results are evaluated in accordance with enterprise procedures 4.2 Results are ***documented*** and reports/recommendations are confirmed with the appropriate personnel
5. Report outcomes of emergency response	5.1 Improvements to incident response procedures are ***identified*** and confirmed with the appropriate personnel. 5.2 Improvements to incident response procedures are implemented.

Variable	**Range**
Technical advice may include	• plant layout and location • isolation points • location and quantity of hazardous substances and location of fire hydrants, pumps and water supplies
External emergency groups may include	• police • fire brigade • ambulance • national emergency service supply authorities (such as water utility)
Personnel refers to	• all people on site at the time of the emergency and may include supervisory, maintenance and operational staff, contractors, trainees and visitors
Safety standards may include	• relevant sections of occupational health and safety legislation, enterprise safety rules, national standards for plant and relevant state and federal legislation
Site hazards may include	• power lines • trees • overhead service lines • abnormal weather conditions • dangerous materials/chemicals • earthworks/obstructions • underground services • hazardous substances and electrical

	• thermal • explosive and structural hazards
Special assistance may be	• on site personnel (e.g. chemists, fire team), • rescue team • environmental officer • safety officer • radiation officer floor warden or equivalent • chief warden or equivalent and security staff
Additional resources may include	• personnel • firefighting equipment • firefighting protective clothing • chemical protective clothing • air cylinders for breathing apparatus • rescue equipment • fire retardant compounds • oil containment materials/equipment • vehicles for transport of materials or personnel • stand-by air compressors • storm water pumps • gas monitoring equipment • communication equipment • ladders, spill kits • salvage gear and forcible entry tools
Incidents may include	• fire • rescue • hazardous substances • explosions • bomb alerts • terrorists • radiation • natural disasters • environmental • electrical storms/incidents • accidents • electrical equipment • structural • security related or wildlife related incidents
Information and documentation sources may include	• verbal and written communications • enterprise/site operating instructions • equipment manufacturer's recommendations • dedicated computer equipment • enterprise/site log books
Identification may include	• helmets • armbands • vests • other apparel

Evidence Guide	

Critical Aspects of Competence	Evidence 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 Statement
	• Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
	• Knowledge and application of relevant sections of:
	  • occupational health and safety legislation, statutory legislation and enterprise/site safety procedures
	  • enterprise/site emergency procedures
	  • ability to apply leadership skills
	  • ability to communicate effectively with the appropriate personnel and agencies following an emergency
	  • knowledge of potential hazards
	  • knowledge and application of fire-fighting and rescue principles and techniques
	  • ability to manage the teams response to an emergency situation
	  • dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant occupational health and safety regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures • Enterprise/site emergency procedures and techniques • Plant status • Relevant plant and equipment, its location and operating parameters • Site communications systems • First aid • Appropriate warning signs • Equipment appropriate for the task • Operation of emergency stations • Roles of the first response team and its members • Classifications of fires and emergencies • Roles and responsibilities of emergency services • Firefighting and rescue principles and techniques • Communication principles • Human resources and management principles within a team Material safety data sheets and emergency services
Underpinning Skills	Demonstrates skills to: • Apply relevant occupational health and safety regulations

	• Apply relevant statutory legislation • Apply relevant enterprise/site safety procedures • Apply enterprise/site emergency procedures and techniques • Locate relevant plant and equipment • Prepare emergency plant/equipment for operation • Communicate effectively • Plan and prioritize work • Develop emergency and evacuation procedures • Develop emergency response techniques and procedures • Identify and operate appropriate emergency communications equipment
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. In addition to the resources listed above in Context of assessment', evidence should show competence working in limited spaces with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Manage and Co-ordinate Permit to Work System**
Unit Code	**EIS PSM5 06 0612**
Unit Descriptor	This unit refers to the management of the permit to work system, its implementation, development and application on a day to day basis and during major outages and projects

Elements	Performance Criteria
1. Plan for implementation of permit to work procedures	1.1 Statistical records are consulted to ascertain most favorable time for outage 1.2 Requirements for the development of new procedures, as required, are identified and confirmed 1.3 Identify key stakeholders and/or equipment affected 1.4 Consultation with all key stakeholders to determine whether contingency plans require implementation and/or timetables require review is carried out in accordance with enterprise policy 1.5 Disruptions to key stakeholders are minimized by providing alternative options.
2. Develop permit to work system and procedures	2.1 Requirements for the development of new procedures, as required, are identified and confirmed 2.2 Procedures are researched, created, assessed and confirmed with the ***appropriate personnel*** 2.3 Procedures are planned and developed in accordance with statutory, enterprise/site requirements 2.4 Resources are identified, obtained and utilized for development of the work system 2.5 Procedures are documented and approved in accordance with enterprise procedures
3. Implement permit to work procedures	3.1 Work requirements are identified from relevant personnel and ***documentation*** 3.2 ***Permit to work*** is planned and prepared to achieve the defined work requirement in accordance with statutory, enterprise and site procedures 3.3 Plant isolations are coordinated and confirmed with the appropriate personnel 3.4 Issue, cancellation and recording of the permit to work is carried out in accordance with enterprise and site procedures 3.5 Plant de-isolation and restoration is coordinated and

	confirmed with the appropriate personnel 3.6 Documentation is completed in accordance with enterprise/site requirements 3.7 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of on-the-job training
4. Co-ordinate outage permit to work requirements	4.1 Outage plan is obtained from, and confirmed with, the appropriate personnel 4.2 Critical paths, major milestones and potential conflicts between permits are identified and assessed 4.3 Permit to work plan is created and structured to achieve outage targets 4.4 Permits are planned in accordance with statutory, enterprise/site procedures 4.5 ***Resources*** are identified, obtained and utilized to ensure outage plan is maintained 4.6 Issue and cancellation of permits is controlled and coordinated in accordance with work requirements 4.7 De-isolation and restoration of plant is planned and coordinated to meet re-commissioning targets 4.8 Records are maintained during the outage in accordance with enterprise/site requirements
5. Manage permit to work system	5.1 Permit to work system incidents are identified 5.2 ***Incidents*** are investigated and assessed 5.3 Results and recommendations relating to incident investigations are documented and confirmed with the appropriate personnel and in accordance with enterprise procedures
6. Audit permit to work procedures	6.1 Permit to work system is audited, and results are evaluated in accordance with enterprise procedures 6.2 Audit results are documented and reports/ recommendations are confirmed with the appropriate personnel 6.3 Recommendations relating to ***audit r***esults are documented and confirmed with the appropriate personnel and in accordance with enterprise procedures

Variable	**Range**
Appropriate personnel	May include but not limited to: • project engineers and leaders, maintenance personnel, operations personnel, internal and external specialist

	services personnel, line management, contractors and standing permit to work and/or safety committees.
Documentation	May include but not limited to: • occupational health and safety and environmental legislation, industry standards, enterprise safety and/or permit to work rules, enterprise and site procedures, enterprise permit to work documentation/form(s), operation and maintenance manuals, plant drawings and schematics and computer based software packages
Resources	May include but not limited to: • approved documentation/form(s), manpower, isolation equipment (locking devices, signs etc) and personal or mainframe computers
Permit to work	May include but not limited to: • any approved documentation/form(s) controlled by the safety rules or permit to work procedures of the candidates enterprise
Incidents	May refer to : • permit to work system breaches
Auditing	May include but not limited to: • quantity, quality and suitability of permits and isolation procedures Incidents may refer to permit to work system breaches

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures • Apply sustainable energy principles and practices • Demonstrate an appropriate level of skills enabling employment • Conduct work observing the relevant legislation, regulations, polices and workplace procedures • Statutory legislation; • Enterprise/site safety procedures; • Enterprise/site emergency procedures • Implementing permit to work system • Coordinating permit to work system • Managing permit to work system
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant Occupational Health and Safety regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures • Enterprise/site emergency procedures and techniques • Plant status • Relevant plant and equipment, its location and operating

	parameters • Environmental legislation • Enterprise recording procedures • Computers and software • Auditing procedures and techniques • Investigation and evaluating techniques • Communication principles • Human resources and management principles • General responsibilities for plant operations • Safe operating principles Auditing principles and incident investigation • Development and management techniques • Introduction to power production plant • Typical arrangements of power production plant • Thermodynamics • Properties of matter • Power plant cycle • General responsibilities for power production plant operations • Control of a boiler • Basic turbine construction and operating principles • Turbine operations • Electrical principles • Transformers; AC generators; Alternators, excitors and hydrogen systems • Switchgear; Electrical protection; • Schematic diagrams • Auxiliary supply systems; • High voltage systems; High voltage switching procedures • Safe operating principles
Underpinning Skills	Demonstrates skills to: • Manage the application of relevant OHS regulations • Relevant statutory legislation • Relevant enterprise/site emergency procedures and techniques • Communicate effectively • Apply data analysis techniques and tools • Develop and manage permit to work systems • Access and use diagrams, drawings and symbols • Conduct audits and review incident reports • Apply enterprise/site safety procedures • Locate relevant plant and equipment • Identify plant status • Plan and prioritize work • Apply planning principles and techniques • techniques and tools • Manage human resources

Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Manage the Network/System**
Unit Code	**EIS PSM5 07 0612**
Unit Descriptor	This unit refers to the management of a network/system. Systems may be interconnected, remote or isolated

Elements	**Performance Criteria**
1. Plan and prepare network operations	1.1 ***Information and documentation*** to determine network/system status is assessed and evaluated in accordance with system requirements 1.2 Network/system and associated ***equipment*** operational pre-requisites are established in accordance with enterprise/system procedures 1.3 Sequence for re-commissioning of network sections and equipment is identified and determined to suit existing circumstances in accordance with enterprise/system procedures 1.4 Forecast prediction is based on the accurate interpretation and analysis of relevant information in accordance with system procedures 1.5 Network/***system limitations*** and performance due to location and external influences are identified 1.6 Where appropriate, the ***teams*** and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2. Manage and control network /system.	2.1 Network/system is operated in accordance with enterprise/system operating procedures 2.2 Network/system demand is met with contingencies in place to maintain quality of supply standards in accordance with statutory requirements 2.3 Network/system ***voltage*** and current requirements are assessed, evaluated and controlled to maintain stability and system integrity 2.4 Voltage/load profiles are identified and adhered to minimizing transmission losses 2.5 Network/system load shedding sequence and priorities are monitored to ensure system integrity 2.6 Network/system data is monitored for normal operation or to detect deviations 2.7 Corrective actions to rectify abnormalities are implemented following analysis of data in accordance

	with system procedures 2.8 Resources required to meet system requirements are identified and coordinated in accordance with system procedures 2.9 Where required, operations are carried out in consultation with team members
3. Analyze and respond to network/ system faults or incidents	3.1 Causes of abnormal network/***system operating conditions*** are identified by analyzing the ***technical and operational*** information in a logistical and sequential manner 3.2 ***Operation*** of protection systems are identified and assessed to evaluate the nature and cause of fault conditions. 3.3 ***Communication*** may be established with other authorities and/or key stake holders to identify nature/source of system interference 3.4 Corrective action is taken in accordance with enterprise/system procedures 3.5 Network/***system integrity*** and personnel safety are maintained through consultation with appropriate personnel and reference to plant technical, operational documentation and contingency plans
4. Review incident response and preventative procedures	4.1 ***Incident*** responses are assessed and reviewed in accordance with system procedures 4.2 Alternative responses/***contingencies*** are identified and assessed in accordance with system procedures 4.3 Alternative responses/contingencies are documented and approved in accordance with system procedures
5. Complete documentation	5.1 Documentation is updated, log sheets maintained equipment/system problems, movements abnormalities and status are reported and logged in accordance with enterprise/site procedures

Variable	**Range**
Information and documentation sources	May include but not limited to: • 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

	• Systems may be interconnected, remote or isolated
Equipment	May include but not limited to: • machines • circuit breakers • tap changers • protection settings • capacitor/condenser banks • generators and • SCADA systems
System limitations	May include: • location • weather conditions • natural disasters • accidents • temperature • power swings
Appropriate personnel, team members/other authorities	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 • field operators • restricted operators • emergency personnel • network controllers/ coordinators • generation controllers, plant operators • field operators • support staff • fire service • police, ambulance • emergency services • enterprise and site representatives • consumers and independent power producers
Team members/other authorities	May include: • network controllers/coordinators • generation controllers • plant operators • field operators • support staff • fire service • police • ambulance • emergency services • enterprise and site representatives • consumers and independent power producers

Voltage control	May be: • synchronous compensator • generation VAR output • capacitor/condenser • switchgear • tap changers • network configuration
System condition	May be but not limited to: • may voltage profiles • spare plant • generation/transmission capability limits • deviation from generation schedule • variation from normal trends • plant testing • switching programs • responsive spinning reserve
Technical and operational indicators	May include but not limited to: • local indicators and recorders • computers and alarms (visible and or audible)
Unit operations	May include: • spurious faults in automatic systems • automatic systems operating out of range • failure of automatic system components • routine plant movement
Communications	May be by means of : • telephone • two way radio • pager, computer (electronic mail) • operating logs (written or verbal)
System integrity	May be affected by: • machine and system stability • transmission line and transformer overloading • correct tap changer position • protection settings • voltage transformer selection • synchronizing • required load shedding selected • capacitor/condenser bank selection • loss of network • generation components
Types of incidents	May include: • localized blackout • interconnected/ isolated power system potential power system threat • accidents, life threatening situations • generation plant and auxiliary plant faults/failure

	• loss of network and • generation components
Contingencies	May include: • responsive spinning reserve • spare/stand-by plant • load shedding

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge of: • Occupational, health and safety legislation; statutory legislation; enterprise/site safety procedures • Enterprise/site emergency procedures • Relevant system type • Preparing for system operations • Managing and controlling a network/system operation • Coordination requirements • Analyzing and responding to faults and abnormal system operating conditions Impact of actions
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant OHS regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures • Enterprise/site emergency procedures and techniques • Plant status; Relevant plant and equipment, it's location and operating parameters • Enterprise recording procedures • System/Network types and characteristics • Contingency plans • Problem solving • Supervisory, alarm, protection and control equipment • Switchgear operation • Load shedding principles • Communication principles • Control and data acquisition systems • Computers and software • Switching practices and procedures
Underpinning Skills	Demonstrates skills to: • Apply relevant OHS regulations • Apply relevant statutory legislation • Apply relevant enterprise/site safety procedures; • Apply enterprise/site emergency procedures and techniques • Apply enterprise recording procedures • Manager and control system/network • Identify plant status • Communicate effectively • Apply data analysis techniques and tools

	• Identify and respond to abnormal system operating conditions • Plan and prioritize work • Co-ordinate the operation of system/network to maintain plant • integrity, personnel safety, continuity of supply and optimum efficiency • Use diagrams, drawings and symbols • Apply stress management techniques • Direct and co-ordinate personnel • Select appropriate load shedding • Apply diagnostic techniques
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Power System Operation Management Level V	
Unit Title	**Manage System Re-Start**
Unit Code	**EIS PSM5 08 0612**
Unit Descriptor	This competence unit deals with the skills and knowledge required to manage a system re-start after the islanding or shut down of a system/network.

Elements	**Performance Criteria**
1. Identify cause	1.1 Probable implications are identified and assessed in accordance with enterprise procedures 1.2 Secondary threats to situation are identified and monitored in accordance with enterprise procedures 1.3 The system configuration and/or generation capability is evaluated in accordance with enterprise procedures 1.4 External ***information*** is sort, collated and assessed in accordance with enterprise procedures 1.5 Probable cause of shutdown is identified from available information and resources 1.6 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training 1.7 ***Communication*** with appropriate ***key stakeholders*** is established in accordance with enterprise procedures 1.8 Communications with relevant personnel is established in accordance with enterprise procedures 1.9 Team roles, both internal and external, are identified and conveyed to appropriate personnel in accordance with enterprise procedures
2. Restore system/ network/ generation	2.1 Response is managed in accordance with enterprise/site requirements and allowances for personnel/equipment limitations are made 2.2 Responses are prioritised in accordance with enterprise procedures 2.3 Contingency/re-start plans are implemented in accordance with enterprise/site policy and procedure 2.4 Additional resources are coordinated and directed in accordance with enterprise procedures 2.5 Re-start plans are monitored, evaluated and adjusted as necessary in accordance with enterprise procedures

3. Document	3.1 Equipment failure/problems are recorded and processed in accordance with enterprise procedures 3.2 Feedback from stakeholders is recorded and in accordance with enterprise procedures 3.3 Required reports and findings are generated and distributed to appropriate personnel in accordance with enterprise procedures 3.4 Alternative contingencies/re-start plans and/or recommendations are communicated to ***appropriate personnel*** in accordance with enterprise procedures

Variable	**Range**
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 • equipment and alarm manuals and external stake holder agreements
Communications	May be by means of: • telephone • two way radio • pager • computer (electronic mail) • operating logs (written or verbal) and • intercoms
Liaison with key stakeholders	May be: • system/network controllers/coordinators • oncoming shift change • field operators • support staff • asset centers • patrolmen • customers • other government bodies • co-generation authorities • generation plant operators • on call staff, police • fire • emergency services • private systems and • independent power producers

Appropriate personnel for consultation, to 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 • power plant operations personnel • police • fire brigade • ambulance • emergency services • interconnected equipment personnel • public relations • management • system/network controllers

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • implemented OHS workplace procedures and practices • including the use of risk control measures as specified in the Performance Criteria and Range Statement • applied sustainable energy principles and practices as specified in the Performance Criteria and Range Statement • has knowledge of the roles of external authorities/bodies • has the ability to establish and control emergency situations in operating the network system • has the ability to apply tactical decision making techniques in operating the network system
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • Relevant Occupational Health and Safety regulations • Relevant statutory legislation • Relevant enterprise/site safety procedures • Enterprise/site emergency procedures and techniques • Plant status • Plant operating parameters • Environmental awareness • Relevant plant and equipment, it's location and operating parameters • Enterprise recording procedures • Equipment starting pre requisites • Supervisory, alarm, protection and control equipment • Auxiliary plant and plant operation • Computers and software • External authorities/bodies role • Independent generators • Communication equipment