



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS325B Generate electrical power

Revision Number: 1

PMAOPS325B Generate electrical power

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	In a typical scenario an operations technician operates, monitors, starts up and shuts down power generation systems and ancillary equipment.
------------------------	---

Application of the Unit

Application of the unit	This unit includes operating and monitoring the performance of the power generation plant and making appropriate changes to meet power demand. This includes a full understanding of the process and all OHS requirements including emergency situations. The operations technician would: • identify, correct and report operational problems • be aware of and contribute to a safe working environment • contribute to the safe and productive operation of the system • operate, monitor and maintain equipment using relevant procedures. Generally the operations technician would be part of a team during start-up, shutdown and normal operating conditions. However they would be expected to be capable of demonstrating competence in all parts of this unit. They would be taking a leading role in liaising and cooperating with other members of the team.
--------------------------------	--

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
---------------------------	--	--

Employability Skills Information

Employability skills	This unit contains employability skills.
-----------------------------	--

Elements and Performance Criteria Pre-Content

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

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work.	1.1. Identify work requirements 1.2. Identify and control hazards 1.3. Coordinate with appropriate personnel
2. Prepare for power generation.	2.1. Communicate startup of power generation to all required personnel 2.2. Select the prime mover to be used 2.3. Select system for the generation process appropriate to voltage systems and requirements 2.4. Conduct pre-start-up checks as required 2.5. Start the prime mover for the generation system to procedures 2.6. Synchronise all equipment to transfer the power safely into the system.
3. Operate generation equipment.	3.1. Balance loads and power factors 3.2. Monitor and adjust loads as required to ensure that all machine loads are maintained within safe working conditions 3.3. Distribute energy to the generation system in a safe and efficient manner, ensuring that the status of all equipment is monitored as required 3.4. Rebalance loads as required so as to maximise production efficiency 3.5. Take other appropriate action as required 3.6. Maintain logs to record all systems data and identify all deviations or problems encountered
4. Shut down process.	4.1. Communicate shutdown of process to all required personnel 4.2. Systematically shed loads, shut down generators as required during the shutdown process 4.3. Isolate all required equipment from the bus in accordance with procedures 4.4. Return the system to a balanced operating condition after shutting down selected generator(s).
5. Isolate and de-isolate plant.	5.1. Isolate plant 5.2. Make safe for required work 5.3. Check plant is ready to be returned to service 5.4. Prepare plant for return to service.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Competence includes the ability to isolate the causes of problems to an item of equipment within the system and to distinguish between causes of problems/alarms/fault indications such as:

- instrument failure malfunction
- electrical failure malfunction
- mechanical failure malfunction
- equipment design deficiencies
- changes in fuel quality.

Required knowledge

The knowledge referred to in the Evidence Guide for this unit includes:

- cathodic protection techniques
- switching techniques
- isolation procedures
- earthing techniques
- voltage systems
- electrical generation and distribution theory
- theory of synchronisation
- hazards associated with chemical substances such as PCBs.
- principles of operation of plant/equipment
- physics and chemistry relevant to the process unit
- process parameters and limits, eg temperature, pressure, flow
- duty of care obligations
- hierarchy of control
- communication protocols, eg radio, phone, computer, paper, permissions/authorities
- routine problems, faults and their resolution
- relevant alarms and actions
- plant process idiosyncrasies
- all items on a schematic of the plant item and the function of each
- correct methods of starting, stopping, operating and controlling process
- corrective action appropriate to the problem cause
- function and troubleshooting of major components and their problems
- types and causes of problems within operator's scope of skill level and responsibility.

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Assessment of this unit should include demonstrated competence on actual plant and equipment in a work environment. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation.

Simulation may be required to allow for assessment of parts of this unit. Simulation should be based on the actual plant and will include walk-throughs of the relevant competency components. Simulations may also include the use of case studies/scenarios, role plays and 3D virtual reality interactive systems. In the case of evacuation training or training for competencies practised in life threatening situations, simulation may be used for the bulk of the training.

This unit of competency requires an application of the knowledge contained in the use of the electrical generation system and its integral equipment, to the level needed to maintain control and recognise and resolve problems. This can be assessed through questioning and the use of what-if scenarios both on the plant (during demonstration of normal operations and walk-throughs of abnormal operations) and off the plant.

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

Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action. The emphasis should be on the ability to stay out of trouble rather than on recovery from a disaster.

Consistent performance should be demonstrated. In particular look to see that:

- early warning signs of equipment/processes needing attention or with potential problems are recognised

EVIDENCE GUIDE	
	- the range of possible causes can be identified and analysed and the most likely cause determined - appropriate action is taken to ensure a timely return to full performance - obvious problems in related plant areas are recognised and an appropriate contribution made to their solution. These aspects may be best assessed using a range of scenarios/case studies/what-ifs as the stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations, which may have been generated from the past incident history of the plant, incidents on similar plants around the world, hazard analysis activities and similar sources.
Context of and specific resources for assessment	Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios/case studies/what-ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.
Method of assessment	In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication units. Consider co-assessment with: <i>PMAOPS221B Operate and monitor prime movers.</i>
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Range Statement

RANGE STATEMENT

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

Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
Context	This unit of competency includes all such items of equipment and unit operations which form part of the production/processing system. For your power generation system this may include (select relevant items): • high voltage and low voltage AC and DC • battery systems • uninterrupted power supplies (UPS) • switchboards • prime movers • transformers • unit control panels • electrical protection equipment.
Typical problems	Typical problems for your plant may include: • variation/loss of fuel/energy supply • control equipment failure • power demand changes • change in atmospheric conditions (rain, temperature, wind, lightning) • emergency situations.
Appropriate action	Appropriate action includes: • determining problems needing action • determining possible fault causes • rectifying problem using appropriate solution within area of responsibility • following through items initiated until final resolution has occurred • reporting problems outside area of responsibility to designated person.
Procedures	Procedures may be written, verbal, computer-based or in some other form. They include: • all work instructions • standard operating procedures

RANGE STATEMENT

	• formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (eg Responsible Care) and government regulations.
Health, safety and environment (HSE)	All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence.

Unit Sector(s)

Unit sector	Operational/technical
--------------------	-----------------------

Competency field

Competency field	
-------------------------	--

Co-requisite units

Co-requisite units		
---------------------------	--	--