



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS329B Produce product using liquid extraction

Revision Number: 1

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Modification History

Not applicable.

Unit Descriptor

Unit descriptor	A typical example of liquid extraction occurs in a natural gas processing plant and contains an absorber, de-ethaniser tower, turbo expander compressor, cold separator vessel and various plate fin type heat exchangers. An operations technician would be monitoring and controlling this process in order to achieve condensation of all the desired product to meet a predetermined specification.
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Application of the Unit

Application of the unit	The turbo expander and absorber tower can be considered to be the heart and lungs of the unit. Cryogenic absorbers may be trayed or packed and will be designed to provide sufficient vapour liquid contact to achieve the required overheads and bottoms product specification. The operations technician will be able to: • identify and correct operational problems • determine the impact of composition changes • liaise with maintenance to schedule equipment availability. This competency would be undertaken within a team environment and in conjunction with the overall control of the product being produced.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
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Employability Skills Information

Employability skills	This unit contains employability skills.
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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.
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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. Bring system on line.	2.1. Bring process equipment into operational condition, ensuring that all trays, columns and heat exchangers are operating within their specified parameters 2.2. Make ready liquid extraction systems and related equipment and bring on line during start-up 2.3. Apply a knowledge of turbo expander and Joule Thomson theories and principles to the safe operation of the system.
3. Monitor liquid extraction process.	3.1. Identify cryogenic products and any other hazards to determine what safety requirements may be necessary 3.2. Transfer product to the next stage of the production process. 3.3. Monitor the product variables, ensuring they stay within specification 3.4. Check process equipment, including pumps, compressors and heat exchangers, and keep within operating parameters 3.5. Record product and equipment deviations. 3.6. Take appropriate action
4. Isolate and de-isolate plant.	4.1. Isolate plant 4.2. Make safe for required work 4.3. Check plant is ready to be returned to service 4.4. 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 also includes the ability to isolate the causes of problems to an item of equipment within the liquid extraction system and to distinguish between causes of problems/alarms/fault indications such as:

- process gas variations
- instrument failure/wrong reading
- electrical failure
- mechanical failure.

Required knowledge

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

- principles of operation of liquid extractors
- product tolerances, limitations and specifications
- systems operating parameters
- process control philosophies and strategies
- stabilisation principles
- the basis of cryogenic operations.
- physics and chemistry relevant to the process unit and the fluids involved
- process parameters and limits, eg temperature, pressure, flow, pH
- 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 plant
- corrective action appropriate to the problem cause
- function and troubleshooting of major components and their problems

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 liquid extraction and 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
- the range of possible causes can be identified and

EVIDENCE GUIDE	
	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 relevant fluid flow units.
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 liquid extraction system. For your plant this may include (select relevant items): • absorber tower • expanders/compressors • lube oil system • instrumentation • cold separator • pumps • fans • refrigeration systems or cryogenic systems.
Typical problems	Typical problems for your plant may include: • design temperature constraints • CO2 freezing • flooding.
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 • formulas/recipes • batch sheets

RANGE STATEMENT

	- 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
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		
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