



Australian Government

Department of Education, Employment and Workplace Relations

NWP353B Monitor, operate and control anaerobic bioreactor processes

Revision Number: 2

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Modification History

NWP353B Release 2: Layout adjusted. No changes to content.

NWP353B Release 1: Primary release.

Unit Descriptor

This unit of competency describes the outcomes required to monitor, operate and control anaerobic bioreactor processes such as UASB's, fluidised bed reactors, anaerobic digesters, high rate anaerobic lagoons and bulk volume fermenters; and to measure and report on system performance and process quality control. The ability to identify faults, determine and apply technical adjustments and produce technical reports is essential to performance.

Application of the Unit

This unit supports the attainment of skills and knowledge required for operational staff with a specific responsibility for ensuring that mixed, fixed and suspended media anaerobic bioreactor processes in treatment plants conform to organisational standards and comply with statutory requirements.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

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 required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Monitor anaerobic bioreactor performance.	1.1 Monitor test results and <i>processes</i> to maintain the parameters of operation. 1.2 Identify and report process faults and the operational condition of plant according to <i>organisational and statutory requirements</i>. 1.3 Correctly select, fit and use required safety equipment, including personal protective equipment.
2 Operate and control anaerobic bioreactor processes.	2.1 Carry out <i>routine plant inspections</i> according to organisational and plant requirements. 2.2 Collect process samples and conduct standard <i>tests</i>. 2.3 Carry out basic <i>system adjustments</i> and <i>process calculations</i> to enhance system performance according to organisational requirements. 2.4 Collect and report process data according to organisational and plant requirements.
3 Compile process records.	3.1 Compile <i>reports</i> from plant and system data to meet organisational procedures and statutory requirements. 3.2 Report observations outside defined parameters for further action.

Required Skills and Knowledge

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

Required skills:

- identify and correct operational and control system problems
- take samples and perform tests
- produce logs and reports
- perform process calculations
- determine chemical dosing requirements
- interpret plans, charts and instructions
- interpret policies, procedures and standards
- give and receive instructions
- operate control and communication systems
- use safety and personal protective equipment
- communicate with employees and various customers
- operate computerised equipment

Required knowledge:

- process layout
- features and components of anaerobic bioreactor systems
- theory of process operation and monitoring
- anaerobic treatment principles
- chemicals used for pH control, odour control, nutrient addition
- flow measurement
- risk factors and potential hazards related to anaerobic bioreactor systems
- risk control requirements including safety equipment and material safety data sheets
- lockout procedures for mechanical and electrical installations and hydraulic isolation
- equipment operation, capacity and limitations
- operation of pumping and valving systems
- control and communications systems
- policies, procedures and relevant legislation
- hazardous materials handling
- interpretation of material safety data sheets
- chemical and biological principles that form the basis of anaerobic wastewater treatment

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.

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

The candidate should demonstrate the ability to monitor, operate and control anaerobic bioreactor processes, including:

- monitoring test results and processes
- identifying and reporting faults
- conducting routine plant inspections
- taking samples and performing basic tests
- making basic process adjustments according to instructions
- collecting data and completing required documentation

Context of and specific resources for assessment

Access to the workplace and resources including:

- documentation that should normally be available in a water industry organisation
- relevant codes, standards, and government regulations

Where applicable, physical resources should include equipment modified for people with disabilities.

Access must be provided to appropriate learning and/or assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice
- a decision of competence only taken at the point when the assessor has complete confidence in the person's competence over time and in various contexts
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence
- where assessment is for the purpose of recognition (RCC/RPL), the evidence provided will need to be authenticated and show that it represents competency

demonstrated over a period of time

- assessment can be through simulated project-based activity and must include evidence relating to each of the elements in this unit

In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge. Questioning will be undertaken in a manner appropriate to the skill levels of the operator, any cultural issues that may affect responses to the questions, and reflecting the requirements of the competency and the work being performed.

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.

Processes may include:

- solids handling, for example:
 - anaerobic digesters
 - sludge disposal
- gas production
- industrial wastewater treatment, such as:
 - upflow anaerobic sludge blanket reactors
 - hybrid reactors
 - fluidised bed reactors
 - fully mixed reactors
 - sealed reactors
 - bulk volume fermenters
 - high rate anaerobic lagoons

Organisational and statutory requirements may include:

- by-laws
- organisational policies
- standard operating procedures
- Australian Drinking Water Guidelines
- Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines
- environment protection
- occupational health and safety
- chemicals
- dangerous goods
- lifts and cranes
- National Water Quality Management strategy
- World Health Organisation standards
- Environment Protection Authority regulations
- licensing agreements
- electrical standards

Routine plant inspections may include:

- use of equipment, including:
 - electronic monitoring and metering systems
 - manual chart recording systems
 - basic hand tools
 - sampling and laboratory testing equipment
 - computerised equipment

- communication equipment
 - personal protective equipment
 - interaction and communication with other employees, other authorities and the general public
 - visual observation
 - identification of corrosion damage
 - implementation of reporting procedures that may also include procedures for the implementation of by-laws, organisational policies and statutory requirements
- Tests** may include:
- settling tests
 - pH
 - redox potential
 - volatile acids
 - gas analysis
 - solids
 - oxygen demand
- System adjustments** may include:
- pH correction
 - raw sludge feed rates
 - digested sludge (biosolids) wasting rates
 - mixing
 - temperature
 - gas disposal
 - supernatant recirculation
- Process calculations** may include:
- mass of solids fed to digester
 - volatile solids loading rate
 - hydraulic retention time
 - solids retention time
 - volatile solids reduction
 - volume of seed sludge required
- Reports** may include:
- plant performance data

Unit Sector(s)

Not applicable.

Competency field

Treatment.