



Australian Government

NWPTRT093 Assess and improve anaerobic digestion processes

Release: 1

NWPTRT093 Assess and improve anaerobic digestion processes

Modification History

Release	Comments
1	This unit was released in NWP Water Training Package release 1.0 and meets the Standards for Training Packages. This unit supersedes and is equivalent to NWP413A Investigate and plan the optimisation of anaerobic treatment processes. • Unit code updated • Content and formatting updated to comply with the new standards • All PC transitioned from passive to active voice • Unit title changed to better reflect unit outcomes • One new PC added to Element 2

Application

This unit describes the skills required to evaluate system performance and investigate and report on optimisation of anaerobic bioreactor processes.

This unit applies to those working as technical staff with a specific responsibility for optimising mixed, fixed and suspended media anaerobic bioreactor processes in wastewater treatment plants.

The skills and knowledge described in this unit must be applied within the legislative, regulatory and policy environment in which they are carried out. Organisational policies and procedures must be consulted and adhered to, particularly those related to measuring and testing, investigation and manufacturers' specifications.

Those undertaking this unit would work autonomously, performing sophisticated, tasks in a familiar context.

No licensing, legislative or certification requirements apply to unit at the time of publication.

Competency Field

Treatment

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range of conditions section.
1. Evaluate anaerobic treatment process performance	1.1 Review existing process performance data. 1.2 Review existing operational processes with reference to manufacturer and plant designer specifications. 1.3 Identify the impact of incoming feed quality on anaerobic treatment processes. 1.4 Identify and coordinate any additional sampling and testing required for valid evaluation of current process performance.
2. Investigate anaerobic treatment plant configuration	2.1 Review existing fault reports and other relevant plant asset information. 2.2 Investigate the operational status of plant components with reference to manufacturers' or plant designers' specifications. 2.3 Carry out investigations to identify potential deficiencies.
3. Investigate the operational options for process optimisation	3.1 Review relevant fault and incident reports and remedial actions taken. 3.2 Investigate potential changes to operational processes to identify possible optimisation strategies.
4. Develop and record a plan for process optimisation	4.1 Determine plant configuration and revised operational processes for process optimisation. 4.2 Plan a trial to test the performance of the determined optimisation options. 4.3 Compile a report making recommendations on optimisation options.

Foundation Skills

The foundation skills demands of this unit have been mapped for alignment with the Australian Core Skills Framework (ACSF). The following tables outline the performance levels indicated for successful attainment of the unit.

ACSF levels indicative of performance:

1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Learning NA					Reading					Writing					Oral communication					Numeracy				

Performance variables:

1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Support					Context					Text complexity					Task complexity				

Further information on ACSF and the foundation skills underpinning this unit can be found in the Foundation Skills Guide on the GSA website.

Unit Mapping Information

This unit supersedes and is equivalent to NWP413A Investigate and plan the optimisation of anaerobic treatment processes.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037>

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Assessment Requirements for NWPTRT093 Assess and improve anaerobic digestion processes

Modification History

Release	Comments
1	These Assessment Requirements were released in NWP Water Training Package release 1.0 and meet the Standards for Training Packages. Assessment Requirements created drawing upon specified assessment information from superseded unit

Performance Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. If not otherwise specified the candidate must demonstrate evidence of performance of the following on at least one occasion.

- coordinating anaerobic treatment process inspection, sampling and testing, including the following tests:
 - chemical oxygen demand (COD)
 - temperature
 - macro nutrients, including nitrogen or phosphorus
 - micro nutrients, including cobalt or iron
 - settling tests
 - pH
 - redox potential
 - volatile fatty acids
 - alkalinity
 - gas analysis
 - solids
- performing mathematical calculations to provide data for the analysis and development of options and solutions, including at least one of:
 - COD removal
 - volatile solids reductions
 - solids retention time
- interpreting a range of complex and technical documents, including at least one of:
 - regulatory, legislative, licensing and organisational requirements
 - codes and standards

- specifications
- organisational policies
- evaluating system performance
- reviewing existing anaerobic treatment process performance with reference to historical data, differences in feed water quality and plant configuration
- identifying data deficiencies and organising additional data collection through appropriate sampling and testing
- assessing fault reports and investigating the current operational status of anaerobic treatment process plant components
- investigating current and potential chemical addition practices
- planning trials to test the performance of the determined anaerobic treatment process optimisation options:
 - recirculation rates
 - addition of nutrients
 - temperature
 - pre-treatment to remove inhibitory or toxic substances
 - alkalinity and pH correction
 - flow or feed rate
 - mixing rate
 - sludge wastage rate
- preparing reports with recommendations

Knowledge Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. If not otherwise specified the depth of knowledge demonstrated must be appropriate to the job context of the candidate.

- principles that form the basis of anaerobic treatment processes including:
 - design parameters:
 - organic loading rate
 - solids retention time
 - hydraulic loading rate
 - temperature
 - mixing strategy
 - volatile solids reduction
 - recycle flow rates
 - detention time
 - chemical oxygen demand (COD) removal
 - volatile fatty acids to alkalinity ratio
 - intended plant configuration
 - feed water quality:

- chemical oxygen demand (COD)
- nutrients
- pH and alkalinity
- total and suspended solids
- salt
- inhibitory compounds
- temperature
- types of anaerobic treatment processes including:
 - up flow anaerobic sludge blanket reactors (UASB)
 - fluidised bed reactors
 - anaerobic digesters
 - high rate anaerobic lagoons (HRAL)
 - bulk volume fermenters (BVF)
- anaerobic microbiology
- pH
- VFA: alkalinity ratio
- nutrient requirements – macro and micro
- gas production and characterisation
- inhibitory substances
- system layout
- principles of anaerobic system maintenance
- range of appropriate procedures (measuring and testing, investigation)
- risk management principles relating to anaerobic treatment processes
- chemical and nutrient dosing processes
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Assessment Conditions

Competency should be assessed in an actual workplace or in a simulated environment, with access to equipment and infrastructure appropriate to the outcome. Competency should be demonstrated over time to ensure the candidate is assessed across a variety of situations.

Consideration must be given to holistic assessment for this unit. Refer to advice in the companion volumes.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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