Australian Government

Department of Education, Employment and Workplace Relations

NWP414A Select strategies to control microbial impact on wastewater treatment processes

Release: 1

NWP414A Select strategies to control microbial impact on wastewater treatment processes

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency describes the outcomes required to identify wastewater microorganisms and select appropriate measures to optimise the growth of beneficial microorganisms.

Application of the Unit

Application of the unit	This unit is relevant to senior wastewater treatment operational specialists.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

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
1Investigate wastewater micro-organisms.	1.1 Identify a range of typical ***wastewater microorganisms***. 1.2 Identify the ***general characteristics*** of different types of microorganisms. 1.3 Identify ***wastewater characteristics*** which impact on micro-organism growth. 1.4 Identify the ***problems caused by microorganisms*** in specific wastewater treatment processes.
2Select strategies to optimise the growth of beneficial microorganisms.	2.1 Investigate the cause of effluent quality issues with reference to ***organisational and legislative requirements*** 2.2 Investigate the operational status of the wastewater treatment process with reference to ***manufacturers' or plant designers' specifications***. 2.3 Assess the effectiveness of various ***process control strategies*** to optimise the growth of beneficial microorganisms and select the most appropriate method.
3Identify and report on appropriate process controls.	3.1 Identify treatment process conditions for optimising the growth of beneficial microorganisms. 3.2 Report on appropriate treatment processes and associated sampling and testing requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills:

- interpret a range of complex and technical documents, including relevant:
- regulatory, legislative, licensing and organisational requirements
- codes and standards
- specifications
- organisational policies
- communicate effectively with a range of relevant parties
- articulate complex ideas clearly
- analyse and evaluate reports and reference materials
- work collaboratively with stakeholders and team members
- analyse problems and apply appropriate remedial solutions
- perform various mathematical calculations to provide data for the analysis and development of options and solutions
- identify hazards and develop appropriate responses to control and mitigate risks in accordance with regulations and legislation
- participate in the provision of appropriate information to inform workplace processes
- apply capabilities and limitations of plant, equipment and tools
- manage work priorities
- use information effectively to improve work performance.

Required knowledge:

- types, lifecycle, characteristics of wastewater microorganisms
- operational problems caused by wastewater microorganisms
- effluent quality problems caused by wastewater microorganisms
- relevant legislation, standards and workplace policies and procedures
- principles of wastewater treatment processes
- process control strategies
- properties and mode of action of chemical additives.

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, 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 identify wastewater microorganisms and select appropriate measures to optimise the growth of beneficial microorganisms including:

- identifying a range of wastewater microorganisms, and their general characteristics and types of problems caused
- identifying effluent quality and select process control strategies to optimise the growth of beneficial microorganisms
- prepare reports outlining the optimum treatment for various microorganisms including measures to ensure validity.

Context of and specific resources for assessment

Access to the workplace and resources, including:

- documentation that should normally be available in a water treatment 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 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

EVIDENCE GUIDE

- 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.

Questioning will be undertaken in a manner appropriate to the skill levels of the operator and cultural issues that may affect responses to the questions, and will reflect the requirements of the competency 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. 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) may also be included.

Wastewater microorganisms may include:	• fungi • bacteria: • aerobic • anaerobic • facultative • autotrophs • heterotrophs • filament and foam causing • protozoa • amoebae • ciliates • flagellates • metazoa • algae • cyanobacteria • helminths.
General characteristics of microorganisms may include:	• evolutionary development • source • structure • life cycle • growth rates and requirements.
Wastewater characteristics may include:	• presence of inhibitory substances, such as heavy metals, synthetic organics • nutrients - macro and micro • temperature • dissolved oxygen • organic loading • pH.
Problems caused by microorganisms may include:	• bulking • foaming • inefficient nitrogen or phosphorus removal • lack of nitrification • high effluent suspended solids or biological oxygen

RANGE STATEMENT

	demand (BOD) • volatile solids reduction • volatile acids to alkalinity ratio • gas production rate - methane, carbon dioxide.
Organisational and legislative requirements may include:	• organisational performance standards • standard operating procedures • quality assurance • federal, state and local environmental and water quality legislation.
Manufacturers' or plant designers' specifications may include:	• Food:Microorganism (F:M) ratio • Mean Cell Residues Time (MCRT) • Mixed Liquor Suspended Solids (MLSS) • phase timing in intermittent or batch processes • temperature • recirculation rates.
Process control strategies may include:	• Food:Microorganism (F:M) ratio • Mean Cell Residues Time (MCRT) • Mixed Liquor Suspended Solids (MLSS) • return and waste activated sludge rates • chemical and nutrient addition • pre-treatment to remove inhibitory or toxic substances • alkalinity and pH correction • mixed liquor recycle rates • phase timing in intermittent or batch processes • recirculation rates • addition of nutrients • temperature • pre-treatment to remove inhibitory or toxic substances • alkalinity and pH correction • chemical addition, such as: • chlorine • nutrients • aluminium and iron salts • flow or feed rate • mixing rate • sludge wastage rate.

Unit Sector(s)

Not applicable.

Competency field

Competency field Treatment