



Australian Government

NWPTRT051 Assess and improve treatment for pathogen removal

Release: 1

NWPTRT051 Assess and improve treatment for pathogen removal

Modification History

Release	Comments
1	This unit was released in NWP Water Training Package release 1.0 and meets the Standards for Training Packages. • New unit, created drawing upon information from deleted unit NWP411A

Application

This unit describes the skills required to identify microorganisms and assess the appropriate drinking water or water re-use treatment processes for inactivation or removal.

This unit applies to those working as water treatment operators responsible for water quality in a range of technical and process applications in water and wastewater treatment.

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.

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. Assess performance of processes to remove	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 raw water quality on water treatment

microorganisms	effectiveness for <i>microorganism</i> removal. 1.4 Review existing fault reports and other relevant plant asset information. 1.5 Investigate the operational status of plant components. 1.6 Investigate the cause of treated water quality issues relating to microorganisms. 1.7 Assess the effectiveness of process control strategies for microorganism removal.
2. Improve process performance for removal of microorganisms	2.1 Identify treatment process conditions for optimising microorganism removal. 2.2 Determine plant configuration and revised operational processes for process optimisation. 2.3 Plan a trial to test the performance of the determined optimisation options.
3. Report on system performance and improvement	3.1 Report on the current operational status of the water treatment process. 3.2 Report on effective treatment processes and associated sampling and testing procedures to maintain water quality. 3.3 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					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.

Range of Conditions

Treatment processes include:	• source water management • pre-treatment processes to address problems associated with waterborne microorganisms • physical treatment processes to remove waterborne microorganisms • disinfection processes to kill or deactivate waterborne microorganisms
Associated problems with microorganisms include:	• algal toxins • taste and odour compounds • disinfection by-products • regrowth, nitrification & disinfection failure

Unit Mapping Information

No equivalent unit.

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 NWPTRT051 Assess and improve treatment for pathogen removal

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.

Performance Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. Candidate must be assessed operating at least one of the processes, treating at least one of the problems, listed in Range of Conditions. If not otherwise specified the candidate must demonstrate evidence of performance of the following on at least one occasion.

- identifying a range of waterborne microorganisms
- analysing general characteristics caused by waterborne microorganisms, including at least one of:
 - pathogenicity
 - virulence
 - resistance to disinfectants
 - opportunistic infection capability
- analysing types of problems caused by waterborne microorganisms, including at least one of:
 - nuisance problems
 - taste and odour
 - filter clogging
 - colour
 - corrosion
 - toxicity problems
 - pathogenic problems
- identifying pathogenic microorganisms and the diseases they cause, including at least one of:
 - viruses
 - bacteria
 - protozoa
 - algae

- cyanobacteria
- helminths
- assessing and selecting water or re-use treatment processes for physically removing or deactivating pathogenic microorganisms, including at least one of:
 - filtration
 - slow sand filter
 - granular media filters
 - membrane filters
- disinfection:
 - chlorination
 - chloramination
 - UV
 - chlorine dioxide
 - ozone
- assessing causes of nuisance and toxicity problems, including at least one of:
 - micro types:
 - diatoms
 - sulphur bacteria
 - cyanobacteria:
 - *Microcystis aeruginosa*
 - *Anabaena circinalis*
 - pathogenic microorganisms:
 - viruses
 - enterovirus
 - hepatitis A
 - hepatitis E
 - rotavirus
 - bacteria:
 - *Campylobacter*
 - *Salmonella*
 - *Escherichia coli*
 - protozoa species:
 - *Giardia*
 - *cryptosporidium*
 - *Nagleria*
 - helminths, including *Ascaris lumbricoides*
- selecting pre- or post-treatment processes for removing the causes of nuisance and toxicity problems, including at least one of:
 - micro-straining
 - algicides

- activated carbon
- ozone-biologically activated carbon (BAC)
- preparing reports on the optimum treatment for a range of microorganisms, including measures to ensure validity
- preparing and applying chemical dosing as required
- assessing process performance
- reviewing existing process barrier performance with reference to historical data, differences in raw water quality and plant configuration
- identifying data deficiencies and additional data collection through sampling and testing
- assessing fault reports and investigating current operational status of processes for microorganism removal
- investigating current and potential chemical addition practices
- planning trials to test the performance of the treatment optimisation options for microorganism removal
- preparing recommendation reports
- applying calculations to determine log removal values for physical barriers and contact time for disinfection
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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.

- types, lifecycle, characteristics of waterborne microorganisms, including:
 - evolutionary development
 - source
 - structure
 - life cycle
 - growth rates and requirements
- nuisance problems caused by waterborne microorganisms
- toxicity and pathogenic problems caused by waterborne microorganisms, including:
 - typhoid
 - cholera
 - ascariasis
 - hepatitis
 - giardiasis
 - cryptosporidiosis
 - gastroenteritis
 - tuberculosis
- relevant legislation, standards and workplace policies and procedures relating directly to the control and treatment of waterborne microorganisms

- principles of water or re-use treatment processes
- log removal value concept for physical barriers
- Ct concept for disinfection
- properties and modes of action of disinfectants
- properties and modes of action for physical barriers
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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.

Some components of this unit require assessment in a workplace environment therefore the unit is not suitable for fully external or electronic based assessment.

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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