

<b>Title</b>	<b>Assess the optimisation of a drinking-water treatment plant, and identify critical control points</b>		
<b>Level</b>	<b>5</b>	<b>Credits</b>	<b>10</b>

<b>Purpose</b>	People credited with this unit standard are able to: assess the raw water source of a drinking-water treatment plant; describe the overall operation of a drinking-water treatment plant; describe and assess how processes in the plant interact; assess and describe plant processes and responses to determine drinking-water treatment plant optimisation; and demonstrate knowledge of emergency situations and process failure conditions in a drinking-water treatment plant; and identify critical control points of drinking-water treatment plant operation that may affect continuous operation, adverse effects, and preventive and corrective actions.
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<b>Classification</b>	Water Industry > Water Treatment
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable legislative and industry requirements.

The treatment plant used to demonstrate competence for this unit standard must include at least filtration and disinfection processes, and have a variable raw water surface source.

This unit standard is to be assessed on site. It is accepted that the range of raw water conditions set out in outcomes one and two are unlikely to occur at the time of the assessment which will thus need to be by way of explanation rather than actual demonstration.

- 2 Legislation and references relevant to this unit standard include: Health and Safety at Work Act 2015, Water Services Act 2021, Resource Management Act 1991, and subsequent amendments; Ministry of Health, *Drinking-water Standards for New Zealand*, Ministry of Health, Wellington, 2005 (Revised 2018), and subsequent replacements, available at [www.taumataarowai.govt.nz](http://www.taumataarowai.govt.nz).

### 3 Definitions

*Drinking-water supply* – the supply catchment, treatment plant, and distribution including tankers. The drinking-water supplier has responsibility for managing the public health risks of the drinking-water supply.

*Industry requirements* include manufacturers' specifications; and enterprise requirements which may include documented workplace policies, procedures, specifications, business, and quality management requirements relevant to the workplace in which assessment is carried out.

*On site* – on the site of a full-scale operating drinking-water treatment plant.

*Optimisation* – adjusting plant input variables to make the process as effective as possible in order to achieve the desired output, taking into account the constraints of cost, human input, water quality, and water demand.

- 4 Learning and assessment activities for this unit standard must be informed by Te Mana o te Wai (refer to [Taumata Arowai](#)) and the *National Policy Statement for Freshwater Management 2020* available from <https://environment.govt.nz/>.

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## Outcomes and performance criteria

### Outcome 1

Assess the raw water source of a drinking-water treatment plant.

#### Performance criteria

- 1.1 The range in raw water quality is described on site in terms of source type, climate, topography, catchment land use and geology, seasonal variations, and human activity.
- 1.2 Assessment of the treatment options appropriate to the characteristics of a given raw water supply identifies water quality and flow.
- 1.3 The rate of change of key variables is described relative to the ability of the treatment system to adjust.

### Outcome 2

Describe the overall operation of a drinking-water treatment plant.

#### Performance criteria

- 2.1 The water flow paths through a water treatment plant are physically identified on site.
- 2.2 The flow control elements are identified and explained on site.
- 2.3 The individual plant process sections are identified and described in terms of their functions.
- 2.4 Chemical dosing systems components are identified on site in terms of the controls of each chemical dosing system.

2.5 Final water quality monitoring and plant automatic controls adjustment are described.

2.6 Manual control or intervention controls that are carried out are described.

### **Outcome 3**

Describe and assess how processes in the plant interact.

#### **Performance criteria**

3.1 Plant flow rate is assessed in terms of its interaction with other plant processes.

3.2 The relationship and interaction between unit processes is described in terms of the total plant performance.

3.3 Plant water chemistry is assessed in terms of raw water quality variations.

3.4 Adjustment of the plant mechanical processes is assessed in response to raw water quality variations.

### **Outcome 4**

Assess and describe plant processes and responses to determine drinking-water treatment plant optimisation.

#### **Performance criteria**

4.1 Plant processes are described and assessed in terms of their level of optimisation.

Range evidence is required for three plant processes.

4.2 Plant flow rate is assessed in terms of final water quality variations.

4.3 pH is assessed in terms of its effect on all plant processes.

4.4 Coagulation, flocculation, and clarification processes are assessed in terms of their effects on final water quality, and potential problems that affect water quality improvement.

4.5 Filtration processes are assessed in terms of their effects on final water quality, and potential problems that affect water quality improvement.

4.6 Plant disinfection processes are assessed in terms of their effects on final water quality, and potential problems that affect water quality improvement.

4.7 The operation of the plant is assessed for level of optimisation.

**Outcome 5**

Demonstrate knowledge of emergency situations and process failure conditions in a drinking-water treatment plant.

**Performance criteria**

5.1 Critical and emergency situations are identified and explained in terms of the impacts on processes and appropriate responses.

Range includes but is not limited to – floods, mechanical failure, pipeline failure, power supply losses, chemical handling and spills, earthquake awareness.

5.2 Responses to process failures are identified and described.

**Outcome 6**

Identify critical control points of drinking-water treatment plant operation that may affect continuous operation, adverse effects, and preventive and corrective actions.

**Performance criteria**

6.1 The critical control points in treatment plant operation that may affect continuous operation are identified.

6.2 The adverse effects, the causes of the events leading to their occurrence and the level of risk are identified at each critical point.

6.3 The preventive and corrective actions for persistent problems or events related to each adverse effect are identified.

<b>Replacement information</b>	This unit standard replaced unit standard 18457.
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<b>Planned review date</b>	31 December 2027
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	19 September 2008	31 December 2018
Review	2	16 March 2017	31 December 2024
Review	3	26 May 2022	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0101
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

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**Comments on this unit standard**

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council at [qualifications@WaihangaAraRau.nz](mailto:qualifications@WaihangaAraRau.nz) if you wish to suggest changes to the content of this unit standard.