Title	**Demonstrate knowledge of and operate biological treatment systems for effluent water in an energy and chemical plant**		
Level	**4**	**Credits**	**8**

Purpose	This unit standard is intended for people working as boiler operators and energy and chemical process operators in an energy and chemical plant. People credited with this unit standard are able to demonstrate knowledge of: biological effluent water treatment in the energy and chemical industry; and equipment and processes for biological effluent water treatment in an energy and chemical plant. They are also able to operate biological treatment equipment and processes for biological effluent water treatment; and interpret and act on effluent water quality data, in an energy and chemical plant.

Classification	Energy and Chemical Plant > Operation of Energy and Chemical Plant

Available grade	Achieved

Guidance Information

1 Legislation relevant to this unit standard includes but is not limited to:
- Health and Safety at Work Act 2015;
- Hazardous Substances and New Organisms Act 1996;
- Resource Management Act 1991;

and any subsequent amendments.

2 Definitions

Energy and chemical plant may be in – petrochemical, agri-nutrient, power generation, dairy processing, meat processing, and wood fibre manufacturing, or other plants that operate with a combination of high temperatures, pressures, steam and/or chemicals in gas, liquid or solid form.

Organisational requirements – documented policies and procedures. These may include: equipment manufacturers' procedures, plant procedures; suppliers' instructions; site signage; codes of practice; company health and safety plans; on site briefings; and supervisor's instructions. This includes all regulatory and legislative obligations that apply to the plant.

Plant – the operational unit, equipment and/or workplace at which the person is working.

3 For the purposes of assessment:

- evidence for the practical components of this unit standard must be supplied from the workplace.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of biological effluent water treatment in the energy and chemical industry.

Performance criteria

1.1 Identify microorganisms used for biological effluent water treatment in terms of type.

1.2 Describe the classification of microbes used in biological treatment in terms of oxygen requirements.

Range evidence of three classifications is required.

1.3 Describe the process of biological effluent water treatment in terms of the relationship between effluent conditions and microbe life.

Range conditions include but are not limited to – pH, oxygen content, nutrients, temperature;
microbes include but are not limited to – aerobic, anaerobic, facultative.

1.4 Describe the impact of food to microorganism ratio in terms of the system loading and retention time.

1.5 Describe the action of microorganisms on substances in terms of their impact on effluent water quality.

Range substances include but are not limited to – organics, biodegradable materials, non-biodegradable materials, heavy metals.

Outcome 2

Demonstrate knowledge of equipment and processes for biological effluent water treatment in an energy and chemical plant.

Performance criteria

2.1 Describe the components of a biological treatment system in terms of the design and operating principles and in accordance with organisational requirements.

Range components may include but are not limited to – dissolved air flotation unit, aeration lagoon, facultative lagoon, anaerobic lagoon, oxygenation basin, degassing basin, clarifier, trickling filter, rotating biological contactor;
evidence of the components present in the candidate's plant is required.

2.2 Describe equipment items used in a biological treatment system in terms of the design and operating principles and in accordance with organisational requirements.

Range evidence of the system used in the candidate's plant is required.

2.3 Describe nutrient chemicals used for biological treatment in terms of their nutrient effects on the operation and in accordance with organisational requirements.

Range evidence of two effects is required.

2.4 Describe materials used in the construction of biological treatment systems in terms of purpose conditions and in accordance with organisational requirements.

Range evidence of the materials used in the candidate's plant is required.

2.5 Identify and describe deviations from normal operating parameters that can occur in biological treatment systems in terms of the operational steps and techniques used to respond to each deviation and in accordance with organisational requirements.

Range parameters include but are not limited to – volumes, temperatures, flow rates, contaminants, time;
disruptions include but are not limited to – process deviations, equipment malfunctions;
evidence of two deviations from normal operating parameters is required.

2.6 Describe required sludge quality in terms of discharge consents in accordance with organisational requirements.

Outcome 3

Operate biological treatment equipment and processes for biological effluent water treatment in an energy and chemical plant.

Performance criteria

3.1 Identify the location of biological treatment equipment using the site-specific identification coding system in accordance with organisational requirements.

3.2 Operate biological treatment equipment and processes using safe work practices in accordance with organisational requirements.

3.3 Carry out checks and routine procedures on biological treatment equipment and processes in accordance with organisational requirements.

3.4 Identify any plant disruption and take corrective actions in accordance with organisational requirements.

Range evidence of three different types of plant disruption is required.

3.5 Complete all plant documentation related to the process and equipment operation in accordance with organisational requirements.

Outcome 4

Interpret and act on effluent water quality data in an energy and chemical plant.

Range evidence of two water quality parameters is required.

Performance criteria

4.1 Take and analyse samples in accordance with organisational requirements.

4.2 Document effluent water quality data in accordance with organisational requirements.

4.3 Interpret effluent water quality data to identify deviations from operating standards in accordance with organisational requirements.

4.4 Take and record required actions in accordance with organisational requirements.

Planned review date	31 December 2024

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 November 2000	31 December 2014
Revision	2	24 July 2002	31 December 2014
Review	3	27 June 2005	31 December 2014
Rollover and Revision	4	25 July 2006	31 December 2014
Review	5	22 May 2009	31 December 2016
Review	6	24 October 2014	31 December 2022
Review	7	27 February 2020	N/A

Consent and Moderation Requirements (CMR) reference	0079

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact the Primary Industry Training Organisation standards@primaryito.ac.nz if you wish to suggest changes to the content of this unit standard.