Title	**Demonstrate knowledge of and operate systems for boiler feedwater treatment**		
Level	**4**	**Credits**	**15**

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: boiler feedwater treatment processes; the effects of boiler feedwater treatment systems; and a boiler feedwater treatment system, used in an energy and chemical plant. They are also able to operate boiler feedwater treatment equipment and processes; and interpret and act on water quality data for a boiler feedwater treatment system, in an energy and chemical plant.

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

Available grade	Achieved

Guidance Information

1 Legislation and codes of practice relevant to this unit standard include but are not limited to:

- Health and Safety at Work Act 2015;
- Hazardous Substances and New Organisms Act 1996;
- Resource Management Act 1991;
- *Approved Code of Practice for The Design, Safe Operation, Maintenance and Servicing of Boilers* available at https://worksafe.govt.nz/dmsdocument/1571-acop-the-design-safe-operation-maintenance-and-service-of-boilers;
- *Approved Code of Practice for the Management of Substances Hazardous to Health (MOSHH) in the Place of Work*, Occupational Safety and Health Service, 1997;

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 boiler feedwater treatment processes in an energy and chemical plant.

Performance criteria

1.1 Describe boiler feedwater treatment in terms of methods of chemical treatments used.

Range methods include but are not limited to – corrosion control, scale inhibition, condensate treatment, pH control, embrittlement prevention, oxygen scavenging.

1.2 Describe processes used in boiler feedwater treatment in terms of mechanical treatments used.

Range processes include but are not limited to – filtration, demineralisation, chemical softening, de-aeration, distillation, reverse osmosis.

1.3 Identify and describe boiler feedwater equipment in terms of purpose and design concepts.

Range equipment includes but is not limited to – chemical injection unit, analyser, regeneration unit.

1.4 Describe materials used for the construction of boiler feedwater treatment equipment in terms of process conditions and product compatibility.

Range materials include but are not limited to – metals, plastics, fibreglass, rubber.

1.5 Describe hazards associated with water treatment chemicals in terms of safe use.

Range water treat chemicals include but are not limited to – acids, alkalis, coagulants, scavengers, any other plant specific boiler feedwater treatment chemicals.

Outcome 2

Demonstrate knowledge of the effects of boiler feedwater treatment systems in an energy and chemical plant.

Performance criteria

2.1 Describe the impacts of inadequate boiler feedwater treatment in terms of boiler operations.

Range impacts include but are not limited to – corrosion, scale, fouling, foaming, total dissolved solids, dissolved gases, pH variation.

2.2 Describe the reasons for the different water treatment requirements of boilers at different operating pressures in terms of water quality.

Range water quality includes but is not limited to – total dissolved solids, alkalinity, suspended solids, dissolved gases.

2.3 Describe types of blow down and their operation in terms of the effect on water quality.

Range blow down types include but are not limited to – continuous, intermittent, automatic.

2.4 Describe condensate return on boiler operational effectiveness in terms of the impacts.

Range operational effectiveness includes but is not limited to – energy efficiency; conservation of water; contamination from oil, iron and process materials; conductivity levels.

2.5 Describe the processes for wet and dry boiler lay-up in terms of the purpose for each type of lay-up.

Outcome 3

Demonstrate knowledge of a boiler feedwater treatment system used in an energy and chemical plant.

Performance criteria

3.1 Describe the layout, operation of components and process controls for a boiler feedwater treatment plant in accordance with organisational requirements.

3.2 Identify and describe deviations from normal operating parameters that can occur in a boiler feedwater treatment plant in terms of the operational steps and techniques used to respond to each deviation and in accordance with organisational requirements.

Range evidence of three deviations from normal operating parameters is required.

Outcome 4

Operate boiler feedwater treatment equipment and processes in an energy and chemical plant.

Performance criteria

4.2 Identify the location of boiler feedwater treatment plant equipment in accordance with the site-specific identification coding system and organisational requirements.

4.2 Operate a boiler feedwater treatment plant using safe work practices in accordance with organisational requirements.

4.3 Carry out checks and routine procedures in a boiler feedwater treatment plant in accordance with organisational requirements.

4.4 Identify plant disruptions and take corrective actions in accordance with organisational requirements.

Range plant disruptions include but are not limited to – process deviations, equipment malfunctions;
evidence of three different types of plant disruption is required.

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

Outcome 5

Interpret and act on water quality data for a boiler feedwater treatment system in an energy and chemical plant.

Range evidence of three water quality parameters is required.

Performance criteria

5.1 Take and analyse samples in accordance with organisational requirements.

5.2 Document water quality data in accordance with organisational requirements.

5.3 Interpret water quality data and identify deviations from operating standards in accordance with organisational requirements.

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

Replacement information	This unit standard was replaced by skill standard 40440.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 June 2005	31 December 2014
Rollover and Revision	2	25 July 2006	31 December 2014
Review	3	22 May 2009	31 December 2016
Review	4	24 October 2014	31 December 2022
Review	5	27 February 2020	31 December 2026
Review	6	24 April 2025	31 December 2026

Consent and Moderation Requirements (CMR) reference	0079

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