

Title	Describe and operate geothermal binary plant in the energy and chemical industry		
Level	4	Credits	20

Purpose	<p>This unit standard is intended for people working as boiler operators and energy and chemical process operators in an energy and chemical plant.</p> <p>People credited with this unit standard are able to describe: geothermal binary plant processes and equipment used in the energy and chemical industry; and the operation of geothermal binary plant and identify deviations from normal operating parameters. They are also able to operate a geothermal binary plant in the energy and chemical industry.</p>
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Classification	Energy and Chemical Plant > Operation of Energy and Chemical Plant
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Available grade	Achieved
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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.

- 4 This unit standard covers the operation of a binary plant but not the generation of electricity.

Outcomes and performance criteria

Outcome 1

Describe geothermal binary plant processes and equipment used in the energy and chemical industry.

Performance criteria

- 1.1 Describe a geothermal binary plant in terms of layout and operational principles.
- Range layout includes but is not limited to – equipment, flows, Rankin cycle, motive fluid system, heating medium system.
- 1.2 Describe the physical properties of motive fluid in terms of their relationship to its use.
- Range physical properties include but are not limited to – vaporising temperature, lower explosive limit, upper explosive limit, specific gravity, odour.
- 1.3 Describe the accidental release of the fluid in terms of response.
- 1.4 Describe geothermal binary plant equipment in terms of design and operating concepts.
- Range equipment includes but is not limited to – heating medium system, pre-heaters, vaporiser, separator, recuperator, condenser.
- 1.5 Describe binary turbine components in terms of design and operating concepts.
- Range components include but are not limited to – rotor, nozzles, governor, governor valves, emergency stop valves, glands, seal systems, bearings, motive fluid inlet and outlet.
- 1.6 Describe geothermal binary plant auxiliary equipment and systems in terms of design and operating concepts.
- Range auxiliary equipment includes but is not limited to – lube oil, seal oil, seal cooling, seals, fans, purging systems, feed pumps, condensate pumps.

Outcome 2

Describe the operation of a geothermal binary plant and identify deviations from normal operating parameters.

Performance criteria

- 2.1 Describe the geothermal binary plant in terms of control systems used.
- Range control systems include but are not limited to – pressure control, level control, power output control, heat medium control; evidence is required of one control loop for each of the above.
- 2.2 Describe the geothermal binary turbine in terms of protection systems.
- Range protection systems include but are not limited to – overspeed, vibration, oil pressure, seal and lube oil pressure, control air pressure; evidence is required of one control loop for each of the above.
- 2.3 Identify deviations from normal operating parameters that can occur in the geothermal binary plant in terms of the operational steps and techniques used to respond to each deviation.
- Range operating parameters may include but are not limited to – volumes, temperatures, flow rates, contaminants, time; evidence of two deviations from normal operating parameters is required.
- 2.4 Describe the binary plant in terms of manual emergency trip methods.

Outcome 3

Operate a geothermal binary plant in the energy and chemical industry.

Performance criteria

- 3.1 Identify the location of binary plant equipment in accordance with the site-specific identification coding system and organisational requirements.
- 3.2 Operate geothermal binary plant equipment using safe work practices in accordance with organisational requirements.
- 3.3 Demonstrate safe handling techniques when working with the motive fluid in accordance with organisational requirements.
- 3.4 Start up and shut down the geothermal binary plant in accordance with organisational requirements.
- 3.5 Identify plant operational problems and take corrective actions in accordance with organisational requirements.
- 3.6 Carry out plant checks on geothermal binary plant in accordance with organisational requirements.
- 3.7 Complete all plant documentation related to the process and equipment operation in accordance with organisational requirements.

Planned review date	31 December 2024
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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
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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.