40436 Operate geothermal binary plant in the energy and chemical industry

Kaupae | Level	4
Whiwhinga | Credit	20
Whāinga | Purpose	This skill standard is intended for people working as energy and chemical process operators in an energy and chemical plant. People credited with this skill standard are able to: describe geothermal binary plant processes and equipment used in the energy and chemical industry; and identify deviations from normal operating parameters. They are also able to operate a geothermal binary plant in the energy and chemical industry. This skill standard can be used in the New Zealand Energy and Chemical qualifications at Level 4 and above.

Hua o te ako me Paearu aromatawai \| Learning outcomes and assessment criteria

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
1. Describe geothermal binary plant processes and equipment used in the energy and chemical industry.	a. Describe a geothermal binary plant in terms of design, layout and operational principles.
	b. Describe the physical properties of motive fluid in terms of their relationship to its use.
	c. Describe safe handling procedures for motive fluid and the appropriate response to an accidental release of gases.
	d. Identify geothermal binary plant equipment in terms of function and describe its operating concepts.
	e. Identify binary turbine components in terms of design and describe their operating concepts.
	f. Identify geothermal binary plant auxiliary equipment and systems in terms of design and describe their operating concepts.
	g. Describe the geothermal binary plant in terms of control systems used.
	h. Describe the geothermal binary plant in terms of protection systems.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
2. Identify deviations from normal operating parameters.	a. Identify and respond to minor deviations from normal operating parameters in the geothermal binary plant, considering cause and effect.
	b. Identify deviations that may require an emergency shutdown and describe binary plant emergency response procedures.
	c. Describe the binary plant in terms of manual emergency trip methods.
3. Operate a geothermal binary plant in the energy and chemical industry.	a. Locate binary plant equipment in accordance with the site-specific asset tagging system and organisational requirements.
	b. Operate geothermal binary plant equipment using safe work practices in accordance with organisational requirements.
	c. Demonstrate safe handling techniques when working with the motive fluid in accordance with organisational requirements.
	d. Start up and shut down the geothermal binary plant in accordance with organisational requirements.
	e. Identify plant operational problems and take corrective actions in accordance with organisational requirements.
	f. Complete all plant documentation related to the process and equipment operation in accordance with organisational requirements.

Pārongo aromatawai me te taumata paearu | Assessment information and grade criteria

Assessment specifications

- evidence for the practical components of this skill standard must be supplied from the workplace.
- 1a: includes but is not limited to – equipment, flows, Rankin cycle, motive fluid system, heating medium system.
- 1b: physical properties include but are not limited to – vaporising temperature, lower explosive limit, upper explosive limit, specific gravity, odour.
- 1d: equipment includes but is not limited to – heating medium system, pre-heaters, vaporiser, separator, recuperator, condenser.
- 1e: components include but are not limited to – rotor, nozzles, governor, governor valves, emergency stop valves, glands, seal systems, bearings, motive fluid inlet and outlet.
- 1f: includes but is not limited to – lube oil, seal oil, seal cooling, seals, fans, purging systems, feed pumps, condensate pumps.
- 1g: control systems include but are not limited to – pressure control, level control, power output control, heat medium control; evidence is required of one (1) control loop for each of the above.

- 1h: 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 (1) control loop for each of the above.
- 2a: evidence of two (2) deviations from normal operating parameters is required.
- 2b: evidence of two (2) deviations that may require an emergency shutdown.

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.

Ngā momo whiwhinga | Grades available

Achieved

Ihirangi waitohu | Indicative content

- Geothermal binary plant operating parameters, such as – volumes, temperatures, flow rates, contaminants, time.
- Process safety requirements for a geothermal binary plant, such as – major hazard facility requirements, plant safety case.

Rauemi | Resources

Legislation relevant to this skill 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.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa | Standard Setting Body	Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council
Whakaritenga Rārangi Paetae Aromatawai | DASS classification	Manufacturing > Energy and Chemical Plant > Operation of Energy and Chemical Plant
Ko te tohutoro ki ngā Whakaritenga i te Whakamanatanga me te Whakaōritenga | CMR	0079

Hātepe | Process	**Putanga** | Version	**Rā whakaputa** | Review Date	**Rā whakamutunga mō te aromatawai** | Last date for assessment
Rēhitatanga | Registration	1	24 April 2025	N/A
Kōrero whakakapinga | Replacement information	This skill standard replaced unit standard 17609.		
Rā arotake | Planned review date	31 December 2029		

Please contact Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council at qualifications@hangaarorau.nz to suggest changes to the content of this skill standard.