Title	**Control chemical recovery boiler systems for wood pulp manufacturing**		
Level	**5**	**Credits**	**20**

Purpose	People credited with this unit standard are able to: demonstrate knowledge of chemical recovery boiler systems; operate a chemical recovery boiler system; and monitor and control the performance of a chemical recovery boiler system.

Classification	Wood Fibre Manufacturing > Pulp and Paper - Chemical Plants

Available grade	Achieved

Guidance Information

1 Legislation and references
Legislation, regulations and/or industry standards relevant to this unit standard include but are not limited to the:

- Hazardous Substances and New Organisms Act 1996;
- Health and Safety at Work Act 2015;
- Resource Management Act 1991;
- Health and Safety at Work (Major Hazard Facilities) Regulations 2016.

Note: legislation requires that operators of chemical recovery boilers hold a relevant boiler operating qualification.

2 Definitions
Operating parameters refer to the boundary conditions in which the operations are carried out in chemical recovery systems for wood pulp manufacturing.
Operating procedures refer to the process(es) that are worked through, e.g. standard operating procedure (SOP) in chemical recovery systems for wood pulp manufacturing.
Worksite documentation refers to organisation policies and procedures that are documented in memo, electronic, or manual format and available in the workplace, and are consistent with manufacturer's requirements. They may include but are not limited to – standard operating procedures, site specific procedures, site safety procedures, equipment operating procedures, quality assurance procedures, product quality specifications, references, approved codes of practice, housekeeping standards, environmental considerations, sustainability, on-site briefings, supervisor's instructions, and procedures to comply with legislative and local body requirements relevant to the pulp and paper industry.

3 Range
Recovery boiler system – black liquor system, green liquor production, chemical makeup and spill reclaim system;
Evidence of all four is required.

4 Assessment information
Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable service information, worksite documentation and legislative requirements. This includes the knowledge and use of suitable tools and equipment.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of chemical recovery boiler systems.

Performance criteria

1.1 The chemical components and composition of black liquor are identified and explained in terms of their origins and organic to inorganic ratios.

Range dissolved lignin, sodium carbonate, sodium sulphide, sodium hydroxide, dissolved oxygen, chlorides and potassium.

1.2 Operating components and process controls of the black liquor system are described and their purpose and operation are explained.

Range operating components and process controls may include but are not limited to – precipitators, cascade evaporator, black liquor heaters, salt cake mixing tanks, low odour unit, spill reclaim system, spill refractometers, control system, air systems.

1.3 Operating parameters and capability of the black liquor system are explained.

Range operating parameters may include but are not limited to – black liquor solids, liquor flow, temperature and pressure, burning rate, effect of salt cake, oxygen levels, alkalinity, sulphide levels.

1.4 Operating components and process controls of the green liquor system are identified, and their purpose and operation are explained.

Range operating components may include but are not limited to – dissolving tank, shatter sprays, spouts, emergency water systems, density and level control, green liquor storage tanks, scrubber systems.

1.5 Operating parameters and capability of the green liquor system are explained.

Range operating parameters may include but are not limited to – density, total titratable alkali (TTA), spout temperatures, agitation of liquor tanks, environmental requirements.

1.6 Safety features and emergency procedures of the black liquor system are identified, and their purpose and operation are explained.

Range safety features may include but are not limited to – safety isolation procedures, plant access procedures, emergency stops, guards, boiler trip system, emergency shutdown procedure, steam smothering, soot blowing, low solids divert system.

1.7 Hazards associated with chemical recovery boiler operation are identified and actions to be taken to minimise, or eliminate the hazard are described.

Range hazards may include but are not limited to – crystallisation, solidification, heat, pressure, explosions.

1.8 Consequences of non-conformance with worksite operating procedures when operating a chemical recovery boiler system are described.

1.9 Roles and responsibilities of the chemical recovery boiler operator are described.

Outcome 2

Operate a chemical recovery boiler system.

Performance criteria

2.1 Safe work practices associated with operating a chemical recovery boiler system are demonstrated.

Range practices may include but are not limited to – plant entry procedures, isolation procedures, lock-outs or tag-outs, emergency shutdown procedure, emergency stops, machine guarding, wearing appropriate safety equipment.

2.2 Chemical recovery boiler system is set up, started up, operated, and shut down.

2.3 Operating parameters are set and adjusted to enable production requirements to be achieved.

Range operating parameters may include but are not limited to– black liquor density, temperature, air flows, pressures;
production requirements may include but are not limited to– environmental compliance, green liquor chemical strength, production rate, steam demand.

2.4 Spill reclaim system is operated.

2.5 Essential care and housekeeping requirements are carried out.

Outcome 3

Monitor and control the performance of a chemical recovery boiler system.

Performance criteria

3.1 A chemical recovery boiler system is monitored and parameters are controlled in accordance with operating parameters.

Range black liquor system control parameters may include but are not limited to – solids, sulphidity, temperature, pressure, air to blox plant, total residual sulphur chemical makeup;
green liquor control parameters may include but are not limited to – green liquor density, tank levels and TTA;
process requirements may include but are not limited to – customer demand, storage levels, production priority, air distribution, opacities, burning rate, total residual sulphur, steam production.

3.2 Operating and equipment faults and malfunctions are identified, and relevant corrective actions are taken.

Range operating faults and malfunctions may include but are not limited to – leakages, blockages, boiler fouling, steam to water differential, contaminations;
equipment faults and malfunctions may include but are not limited to – electrical, mechanical, hydraulic, pneumatic, instrumentation, distributed control system.

3.3 Output green liquor and steam for quality limits are monitored.

Range green liquor requirements may include but are not limited to – liquor strength, density;
steam requirements may include but are not limited to – pressure, temperature, silica and sodium content.

3.4 Production rate is regulated in accordance with process requirements.

3.5 Production, maintenance, and quality records are completed.

3.6 Product and process testing is carried out.

Range product and process testing may include but is not limited to – green liquor test, black liquor solids test, smelt reduction test, water quality, steam quality.

Planned review date	31 December 2028

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	22 February 1995	31 December 2024
Revision	2	27 January 1997	31 December 2024
Review	3	25 February 1999	31 December 2024
Review	4	18 December 2006	31 December 2024
Review	5	24 October 2014	31 December 2025
Review	6	30 November 2023	N/A

Consent and Moderation Requirements (CMR) reference	0173

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

Comments on this unit standard

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