

Title	Demonstrate knowledge of the principles of the chemical recovery process in the production of kraft wood pulp		
Level	4	Credits	5

Purpose	<p>People credited with this unit standard are able to: demonstrate knowledge of the purpose of the chemical recovery process in the kraft cycle; explain the black liquor evaporation process; and demonstrate knowledge of the operating principles of a recovery boiler, and the recausticising process.</p> <p>This unit standard aims to provide knowledge of the principles and equipment used in the recovery of chemicals in the kraft process.</p>
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Classification	Wood Fibre Manufacturing > Pulp and Paper - Chemical Plants
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Available grade	Achieved
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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.

2 Definitions

BLOX refers to black liquor oxidation.

SBLOX refers to strong black liquor oxidation.

WBLOX refers to weak black liquor oxidation.

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 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 the purpose of the chemical recovery process in the kraft cycle.

Performance criteria

- 1.1 Reasons for chemical recovery are identified and explained.
- Range chemical cost, economics, heat recovery, environmental.
- 1.2 Elements of the kraft cycle are identified and their functions are explained.
- Range digester, evaporators, BLOX, recovery boiler, causticiser.
- 1.3 Chemicals present in each stage are identified.
- Range chemicals – sodium hydroxide, sodium sulphide, sodium carbonate, sodium sulphate, calcium oxide, calcium hydroxide, calcium carbonate.

Outcome 2

Explain the black liquor evaporation process.

Performance criteria

- 2.1 The requirement to increase the black liquor solids is explained in terms of combustion and safety.
- 2.2 Multiple effect evaporators and their operation are explained in terms of heat exchange, heat recovery, vapour pressures, and solids contents.
- 2.3 Direct contact evaporator operation is explained in terms of solids, flue gas, and odour generation.
- Range type – cascade.
- 2.4 Types of black liquor oxidation are explained in terms of use of air, sodium thiosulphate production, and odour control.
- Range types – SBLOX, WBLOX.

Outcome 3

Demonstrate knowledge of the operating principles of a recovery boiler.

Performance criteria

- 3.1 Functions of a recovery boiler are identified and explained in terms of combustion, chemical conversion, and steam generation.
- 3.2 Components of the recovery boiler are identified, and their functions are explained.
- Range superheater, boiler, economiser, electrostatic precipitator, liquor heater, liquor guns, air ports.
- 3.3 Chemical changes resulting from combustion are identified for organic and inorganic compounds.
- Range sodium carbonate, sodium sulphide, sodium hydroxide, sodium sulphate, lignin.

Outcome 4

Demonstrate knowledge of the recausticising process.

Performance criteria

- 4.1 Components of the causticising plant are identified and their functions are explained.
- Range dregs washer, slaker, causticising tanks, clarifier, filter.
- 4.2 Chemical reactions taking place at the slaking, causticising, and lime kiln are identified and explained.
- Range one reaction at each process is required.
- 4.3 Lime kilns are described, and their operation is explained in terms of drying, heating, and gas release.

Planned review date	31 December 2028
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 November 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.