Title	**Demonstrate knowledge of kraft pulps and pulping processes**		
Level	**4**	**Credits**	**10**

Purpose	People credited with this unit standard are able to demonstrate knowledge of: the kraft pulping process, the equipment used in the kraft cooking process, the effects of kraft cooking process variables on pulp quality, by-products from the kraft cooking process and how they are used, the stages in kraft pulp screening, and the washing of kraft pulp; and explain pollution control measures for the kraft cooking process.

Classification	Wood Fibre Manufacturing > Pulp and Paper Technology

Available grade	Achieved

Guidance Information

1 Definition
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.

2 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 kraft pulping process.

Performance criteria

1.1 Components of kraft pulping systems are identified and their functions are explained.

Range components – chip screens, digester, liquor heaters, blow tank, washers.

1.2 White liquor chemical components are identified and described in terms of their relative proportions.

Range sodium hydroxide, sodium sulphide.

1.3 Kraft recovery function and process stages are explained.

Range stages – washing, evaporation, incineration, causticising.

1.4 Pulp purity determination is explained in terms of residual lignin and kappa number.

Outcome 2

Demonstrate knowledge of the equipment used in the kraft cooking process.

Performance criteria

2.1 Chip preparation and screening are explained in terms of the removal of bark, debris, and undersize and oversize chips.

2.2 Components of a continuous digester system are identified and their functions are explained.

Range components – low pressure feeder, steamer, chip chute, high-pressure feeder, separator, zone circulation, bottom scraper, blow valve.

2.3 Impregnation, heating, cooking, and washing zones in the digester are identified and their functions are explained.

2.4 Functions and operation of the blow tank are explained in terms of disintegration, heat recovery, and pressure relief.

Outcome 3

Demonstrate knowledge of the effects of kraft cooking process variables on pulp quality.

Performance criteria

3.1 Effects of wood species on pulp quality are explained in terms of fibre length and fibre strength.

3.2 Effects of wood density on pulp quality are explained in terms of fibre content, extractives, lignin, and liquor requirement.

3.3 Effects of prolonged wood storage are identified in terms of fungal and bacterial attack and the effect of this on pulp strength.

3.4 Effects of chip dimensions on impregnation and diffusion of cooking liquors and the resulting pulp quality are explained.

3.5 Alkali concentration and sulphidity effects are explained in terms of reaction rate, time, initial delignification, and mill odour.

3.6 H Factor variables are identified and the effects on cooking rate are explained.

Outcome 4

Demonstrate knowledge of the by-products from the kraft cooking process and how they are used.

Performance criteria

4.1 By-products from the kraft cooking process are explained in terms of their uses.

Range by-products – turpentine, tall oil, bark, energy;
uses – varnish, plastics, perfumes, sizing agent, resin, soap, fuel, garden mulch, cost recovery from use of steam and electricity generated.

4.2 The processes used to recover by-products are described.

Range by-products – turpentine, tall oil, bark, energy.

Outcome 5

Demonstrate knowledge of the stages in kraft pulp screening.

Performance criteria

5.1 Knots are defined and the equipment used for their removal is explained.

Range equipment – pressure screen, vibratory screen.

5.2 Knot refiners and their action are explained.

5.3 Purpose of screening systems is described and the types of screens used are explained.

Range screen types – primary, secondary, tertiary, vibratory flat, centrifugal, pressure.

Outcome 6

Demonstrate knowledge of the washing of kraft pulp.

Performance criteria

6.1 Reasons for washing pulp are identified and explained.

Range soda loss, dilution, recovery, effluent.

6.2 Counter current washing is described and the components in the system are identified.

Range components – blow tank, washers, seal tanks.

6.3 Washer types and their operation are explained.

Range vacuum filter, pressure washer, wash press, belt washer, diffuser washer.

Outcome 7

Explain pollution control measures for the kraft cooking process.

Performance criteria

7.1 Non-condensable gas treatment systems for air emission control in kraft mills are explained.

7.2 Measures used in kraft mills to control spills and leakages are explained.

Range avoidance, awareness, education, prevention, spill recovery measures.

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	30 November 2000	31 December 2024
Review	2	18 December 2006	31 December 2024
Review	3	24 October 2014	31 December 2025
Review	4	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.