St. Lawrence TECHNOLOGIES

RESIDUAL MATERIALS

RECYCLING UTILITY POLES TREATED WITH PENTACHLOROPHENOL

ABSTRACT

The 3Rs/ER* of waste management are a critical issue for the treated wood industry. As part of a global waste management plan, LPB Poles Inc., in partnership with St. Lawrence Cement, Bell Canada, Hydro-Quebec, Canadian National, Canadian Pacific Railway and STEPPE-UQAM, recycled utility poles treated with pentachlorophenol (PCP) and used PCP-treated wood wastes as well as creosoted railroad ties for energy reclamation in a cement plant.

The first phase of the project, conducted in Papineauville by LPB Poles Inc., confirmed the technical and environmental feasibility of recycling PCP-treated utility poles.

* See definition on page 2.

MAIN FEATURES

- **Technology**
  - Utility poles treated with PCP are made into beams for industrial use
  - Uses a conventional sawmill
- **Environment**
  - Reduces the amount of waste sent to landfills for disposal
  - Extends useful life of a natural resource
- **Cost**
  - Adds value to treated-wood scrap
  - Creates a new market niche
  - Brings a new product to the marketplace

Saint-Laurent Vision 2000

Environment Canada Protection Québec Region / Environnement Canada Protection Région du Québec

LPB

ST. LAWRENCE CEMENT

Federal Office of Regional Development (Québec) / Bureau fédéral de Développement régional (Québec)

PROJECT OBJECTIVES

The objective of the project was to validate the technical and environmental feasibility of recycling utility poles into wooden beams. Using an existing sawmill, the aims of this technology demonstration project were as follows:

1. Verify the technical feasibility of the recycling process and the quality of the finished product.

2. Estimate recycling yield.

3. Perform a chemical characterization of inputs (poles) and outputs (atmospheric emissions).

4. Compare concentrations of the various discharges against environmental standards.

5. Recognize the potential environmental risks posed by the different by-products and suggest ways to improve facilities to reduce such risks.

6. Confirm the economic viability of the process.

Testing consisted of sawing PCP-treated poles at a conventional sawmill operating at full capacity. New, untreated poles were also sawed at the same rate for the purposes of data interpretation.

* In this document, 3Rs/ER stands for : Reduce at source, Reuse (waste used again in the same form and for the same purpose), Recycle (waste transformed for new use) and Energy Reclamation (waste transformed into energy).

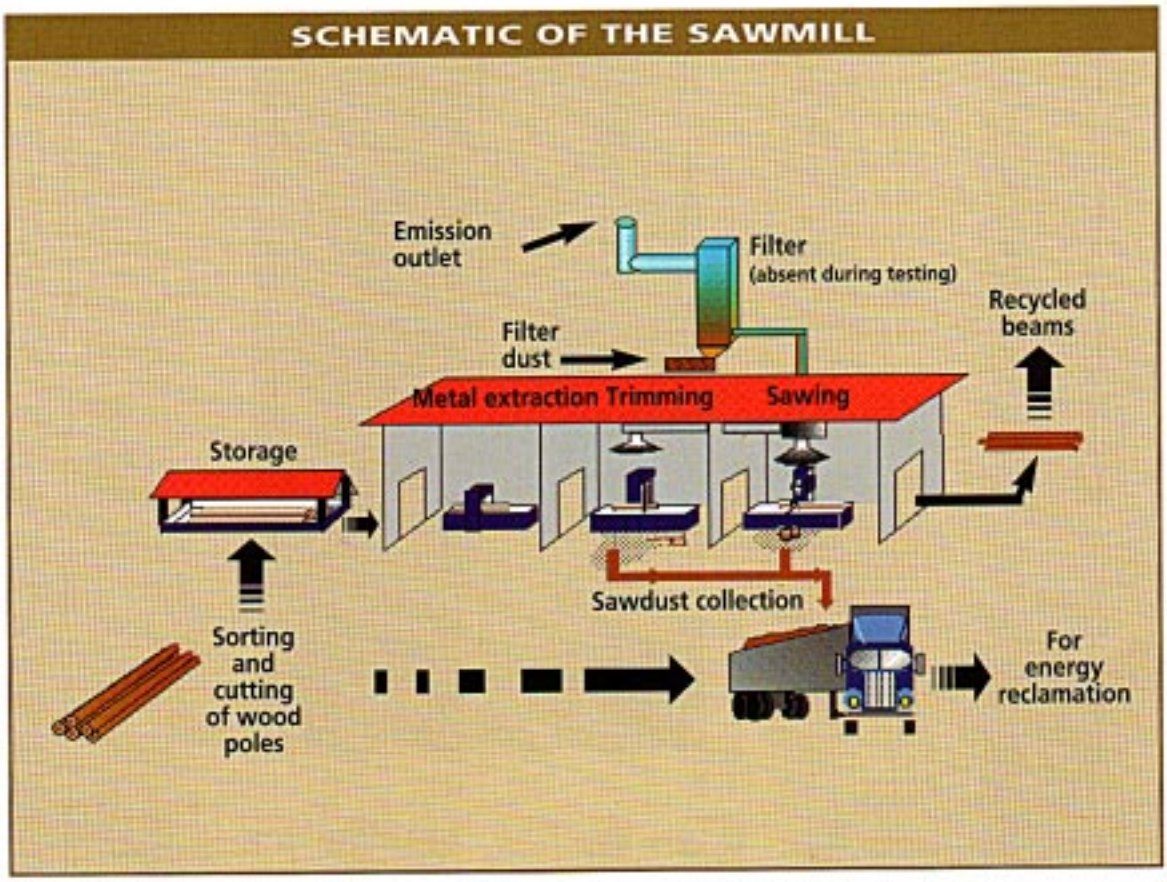
BACKGROUND

In 1996, 12 900 metric tons of utility poles were withdrawn from service in electrical and telecommunications networks in Quebec. Most commonly, these poles are sent to secure landfill sites for disposal. They might be considered a raw material, but utility poles contain preservatives such as PCP, and finding a suitable recycling process is a challenge. Furthermore, any such process must not, in turn, generate harmful by-products or be damaging to the environment.

Following this philosophy, mechanical processes such as sawing must be considered.

TECHNOLOGY

The process consists of sawing utility poles into beams at a conventional sawmill that has not undergone any major modifications. Prior to sawing, the poles are first sorted by condition, then trimmed and cut into standard lengths of 2.4 and 4.9 m (8 and 16 feet). Next, all metal bits in the wood (nails, bolts, etc.) are extracted so as not to damage the saw blade. Lastly, poles are sawed into beams of wood of commercial dimensions.



RESULTS

Tests were conducted on 66 metric tons of utility poles, a combination of 95.5% PCP-treated wood, 4% wood treated with chromated copper arsenate (CCA), and 0.5% creosoted wood. Overall, 33.5% of wood was cut into beams, 18% ended up as sawdust, and the remaining 48.5% was made up of wood scrap from the sorting and trimming process.

This type of activity has few governing parameters. Nonetheless, the atmospheric emissions generated by the saw were sampled, as was the wood used. Chlorophenols, chlorobenzenes, polycyclic aromatic hydrocarbons (PAHs), dioxins and furans were measured, as were the heavy metals suspected to be contained in the CCA-treated wood. Atmospheric emissions were analysed by extracting all gases emitted during sawing; values obtained therefore represent maximum concentrations produced.

Results indicate that emissions are higher for treated wood, except for particulate matter.

The majority of these pollutants are carried in the wood particles released during sawing. As such, concentrations of these compounds in atmospheric emissions could be greatly reduced by the installation of filters. Installation of a gas-suction system surrounding the saw would further reduce concentrations.

Sawdust and nonrecyclable pieces of wood should be recovered and stored for later disposal in a landfill or, better still, reclaimed for energy purposes.

The metal extraction step is necessary to prevent the saw blade from being damaged and also to attain an acceptable production level.

Lastly, an economic evaluation has determined that the benefits of recycling utility poles depend primarily upon operating conditions and on openings in the market, as well as the market price for wooden beams. Beams thus produced do meet the quality requirements of the market, thus appearing to ensure the economic viability of this new product.

TESTING OF RECYCLED PCP-TREATED UTILITY POLES

Main parameters analysed	Emissions	
	Untreated wood	Treated wood
Total chlorophenol	0.3 mg/Nm³	13.6 mg/Nm³
Total chlorobenzenes	0.5 µg/Nm³	1.3 µg/Nm³
Total PAHs	0.2 mg/Nm³	6.6 mg/Nm³
Dioxins and furans	0.7 ng-TEF/Nm³	27.1 ng-TEF/Nm³
Sulphur	0.2 µg/Nm³	479 µg/Nm³
Particles	16.8 g/Nm³	1.6 g/Nm³
Total chromium	9 µg/Nm³	458 µg/Nm³
Gaseous chromium	1.7 µg/Nm³	1.8 µg/Nm³
Total arsenic	9 µg/Nm³	311 µg/Nm³
Gaseous arsenic	5.5 µg/Nm³	4.2 µg/Nm³
Total copper	8.7 µg/Nm³	299 µg/Nm³
Gaseous copper	1.0 µg/Nm³	1.2 µg/Nm³

TEF: Toxicity Equivalency Factor applies to 2,3,7,8-tetrachlorodibenzo-p-dioxin.

POTENTIAL AND LIMITATIONS

The recycling of treated utility poles at a sawmill is a simple and economically profitable undertaking. Where emission-treatment facilities are adequate, the technology respects environmental and human health standards. Because the costs of adapting a conventional sawmill for the purposes of this technique are relatively low, recycling is easy to implement.

Our results indicate that recycling utility poles can only be profitable if the recycled wood market takes shape.

Although testing focused mainly on PCP-treated wood, the process appears to be applicable to other wood preservatives as well. The market for recycled treated wood is not very well developed yet, but market openings are diversified and indeed promising.

This energy-reclamation process conforms to the philosophy of 3Rs/ER now being promoted in Quebec and Canada. Its economic viability, however, depends upon the effectiveness of recovery programs instituted by the treated-wood industry. Moreover, sustainable development requires that resources be protected. Any such technique must be coupled with a waste reduction program and the utmost reuse of treated utility poles before they are simply discarded.

INFORMATION

This technology data sheet was prepared by the STEPPE-UQAM, and based on the results of a demonstration project on the integrated management of treated wood waste. The present project was a joint initiative of LPB Poles Inc., St. Lawrence Cement, Bell Canada, Hydro-Quebec, Canadian National, Canadian Pacific Railway, in cooperation with the Ministère de l'Environnement et de la Faune du Québec and with the technical and financial assistance of Environment Canada and the Federal Office of Regional Development (Quebec). Refer to the data sheet entitled, "Reclaiming treated wood waste as fuel in cement making" for more information on the energy reclamation aspects of this demonstration project.

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St. Lawrence TECHNOLOGIES

St. Lawrence Technologies data sheets are intended for all companies, industries, organizations and individuals interested in new environmental technologies. They are produced by the Eco-Technology Innovation Section, Environment Canada, as part of the St.Lawrence Vision 2000. They serve to disseminate the results of technology development and demonstration projects conducted in the following five sectors: industrial wastewater; contaminated soil; hazardous wastes; contaminated sediment and innovative tool.

Data sheets may be obtained from:
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Publications are available on The Green Lane:
http://www.qc.doe.ca

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Printed at :
J. B. Deschamps Inc.

Published by authority of the Minister of the Environment

Cat. No. : En 1-17 / 30-1997E
ISSN : 1188-8903
ISBN : 0-662-26163-1

November 1997

Cette fiche est également disponible en français sous le titre :
Recyclage de poteaux traités au pentachlorophénol

Bell Hydro Québec CN Canadian Pacific Railway STEPPE • UQAM Canada