

THE PROBLEM

Chloride enters Kraft mill chemical recovery cycles in wood chips, purchased caustic, E_{OP} recycle, and ClO₂ generator spent acid. Natural losses of chloride are low, causing it to accumulate to high concentrations in the recovery boiler cycle. High chloride concentrations cause **recovery boiler plugging and corrosion**, reducing steam generation and causing expensive shutdowns. Chloride is traditionally removed from the system by disposing of a portion of the Recovery Boiler precipitator catch, leading to **costly sodium and sulfate make-up**.

THE SOLUTION

A new system, developed by Paprican is available to remove chloride contamination from the recovery boiler precipitator catch. By lowering the chloride content in Kraft liquors, recovery boiler deposits can be significantly decreased, **reducing boiler pluggage and down-time**.

HOW IT WORKS

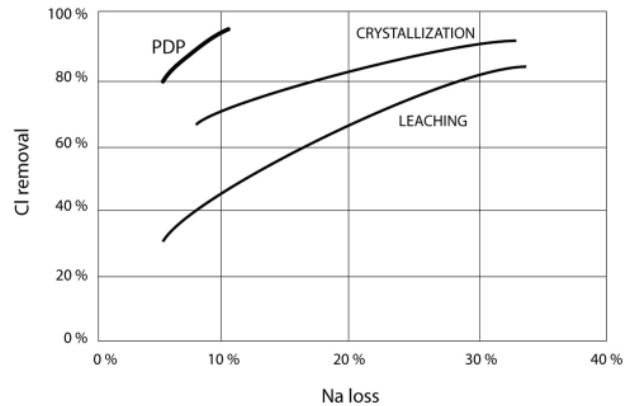


The Precipitator Dust Purification (PDP) system utilizes Eco-Tec's patented Recoflo[®] ion-exchange resin bed to achieve the selective removal of chloride from the precipitator catch. Electrostatic precipitator dust is dissolved in water, filtered in a special pulse filter, and directed to the Recoflo unit. **No chemicals are required for resin bed regeneration** - only water.

BETTER REMOVAL & LOWER COST

Due to the PDP system's **highly selective removal of chloride**, losses of sodium, potassium, sulfate and carbonate are considerably lower than for competing systems, as shown in the following table. At low chloride concentrations, potassium has little effect on deposit behavior. However, if purged, potassium must be replaced by additional sodium make-up.

Typical System Losses

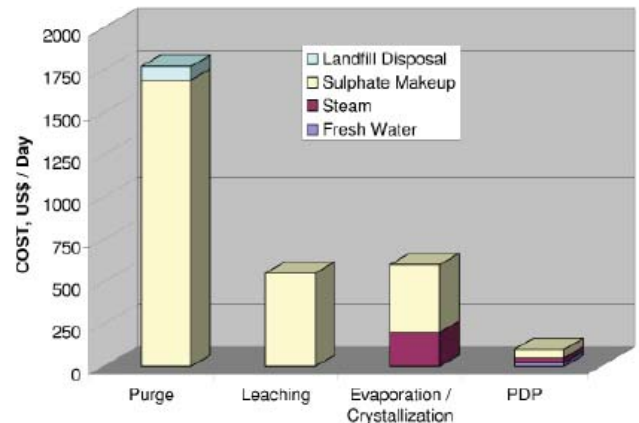


The lower chemical losses for the PDP system correspond directly to **lower make-up requirement**, which is one of the most significant operating expense for a chloride purging or removal system.

CASE STUDY

The figure below, from a third party comparison, shows the **economic benefit** of PDP compared to other methods of Chloride control.

Daily Costs Of Chloride Removal



(FROM Tappi 2(4): 21 (2003))

Lower chemical makeup costs give PDP an economic advantage over other chloride removal methods.

NORAM Engineering and Constructors Ltd.



COMPANY PROFILE

NORAM is an engineering and technology development firm based in Vancouver, Canada. Founded in 1988, NORAM employs a highly qualified technical staff of approximately one hundred. NORAM has a global client base and has successfully completed projects on five continents.

Today NORAM is the world's leading supplier of mononitrobenzene (MNB) plants, a key intermediate in the production of polyurethane. In addition, NORAM offers sulfuric acid equipment, biological treatment facilities, energy systems, and technologies for the chemical, minerals processing, environmental, and pulp & paper industries.

NORAM offers proprietary technology to customers through engineered equipment and complete chemical plants. NORAM's core competencies include:

- Biological Treatment Technologies
- Electrochemical Systems
- Energy Systems
- Environmental Technologies
- Feasibility Studies
- Fluid Dynamics & Finite Element Analysis
- Heat Transfer Systems Design
- Nitration Technology
- Project Management
- Pulp & Paper Technologies
- Sulfuric Acid Manufacture

PARTNERING WITH INNOVATION AND EXPERIENCE

NORAM is focused on the development, commercialization and supply of established and novel processes. With its entrepreneurial culture, NORAM has a demonstrated track record of thinking outside the box to provide innovative solutions. Technologies can be evaluated and integrated into an advanced engineering solution based on first principles.

NORAM has made its mark internationally by supplying proprietary systems to various industries world-wide. NORAM can bring this expertise and innovative ideas to your projects.

NORAM has established strategic relationships with the following organizations:

- ◆ Bateman Engineering BV
- ◆ Canadian Hydrogen and Fuel Cell Association
- ◆ Eco-Tec
- ◆ First Chemical Corporation (A DuPont Company)
- ◆ FP Innovations
- ◆ Kemetco Research Inc.
- ◆ Membrane Reactor Technologies
- ◆ Ostara Nutrient Recovery Technologies Inc.
- ◆ Radient Technologies
- ◆ Siloxy Limited
- ◆ Simon Carves Limited (Punj Lloyd Group)
- ◆ The Electrosynthesis Company

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