

Brown Stock Wash Aid Program Saves \$800,000 in Annual Energy (Steam) Consumption

NALCO Water
An Ecolab Company

CASE STUDY - PAPER

CH-1196

Mill Overview

Mill:	Integrated Kraft Pulp Mill
Grade:	Specialty Graphics & Market Pulp
Equipment:	3 Stage Bleach Plant - D, Eop, D, Batch Digester
Production:	550 TPD (Short-Ton)
Species:	Northern Bleached Soft and Hardwood

BUSINESS SITUATION

An integrated kraft pulp mill in North America was suffering from reduced black liquor evaporator throughput due to high liquor foaming tendencies. The existing suppliers' silicone-based brown stock wash aid program had been unsuccessful in addressing the mill's throughput and liquor foaming tendencies. After evaluating the customer's facility, NALCO Water determined the problem could be solved through custom formulating

a silicone based brown stock wash aid chemistry and integrating a more efficient feeding program. A complete plant audit utilizing the Mechanical, Operational, and Chemical (MOC) approach was conducted that detailed the systems' operating parameters and the specific application points required. As part of detailing the audit findings to the customer, NALCO Water recommended using a silicone concentrate program, SuperWash Technology, as a viable solution.

CUSTOMER IMPACT

eROI™

ECONOMIC RESULTS

Reduced annualized steam generation of 140,000,000 pounds (63,500,000 Kilograms) per year



\$816,200 (USD) per year in reduction of evaporation cost

Reduced chemicals by 350,000 pounds (158,500 kilograms) per year



\$52,000 (USD) in annual chemical cost savings

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

BACKGROUND

Brown stock washers are typically an integral component to the operational and recovery process of a chemical pulp mill. Their location allows for the removal of extractives from the 'pulped' fiber following the chemical deresination pulping process and the recovery of the wash liquor from the process. The chemically cooked pulp from the digesters is washed with the objectives of:

- Removing residual liquor that would contaminate the pulp during subsequent processing steps
- Recovering the maximum amount of spent cooking chemicals with minimum dilution

The primary mechanical aspects of the brown stock washing system is two-fold; both the removal of solids from furnish and the concentration of those solids into the concurrent flow of the wash water. When a washer is not adequately removing the solids from the pulp, foaming occurs in the filtrate tank and low liquor solids results.

- Foam has an inverse effect on washing efficiency. Small bubbles not only impede the passage of wash water through the pulp sheet, but also result in a greater carryover of solids through the subsequent washer.
- The low liquor solids force the evaporators to work harder by having to evaporate more water from the wash liquor. This results in higher energy consumption or reduced throughput rates.

Custom formulated wash-aid chemistries from NALCO Water are often used to reduce the foam on washers and increase the concentration of solids in the wash water, leading to a more efficient operation.

ANALYSIS OF BUSINESS SITUATION

Key Drivers

- Address mill's throughput issues and liquor foaming tendencies.
- Evaluate mill's reduced black liquor evaporator throughput.

Challenge/Opportunity

- Conduct a complete plant audit to determine the best program to meet the customer's needs.
- Reduce the customers' total cost of operation (TCO).

PROGRAM DESIGN

A complete NALCO Water audit identified that using a more efficient and custom formulated SuperWash technology silicone wash-aid, along with making moderate changes in the customers' manufacturing process along with wash-aid feed strategy changes, would elicit significant operational cost savings; which was a complete MOC approach. This technology program was implemented and resulted in generating increased liquor solids to the evaporators,

improving throughput in the evaporators and reducing consequent wash water loss to the sewer. It also reduced the entrained air in the pulp filtrate and foam creation while also reducing the amount of water needed to be evaporated, subsequently reducing steam consumption. In total, this program lead to improved operational efficiencies, reduced chemical additive consumption and significantly improved energy savings

PROGRAM RESULTS

In total, as a result of this new technology program integration, the customer has saved over \$865,000 (USD) per year and has contributed to new monthly and quarterly production records due to the program recommendations and implementation.

The energy (steam) savings to the mill is over \$816,200 (USD) per year. In addition, this new program also reduced liquor losses to the sewer and reduced the need to generate additional chemicals by 350,000 pounds (158,500 kilograms) per year at \$0.15 per pound (\$0.33 per kilogram), a savings equaling over \$52,500 (USD) per year.

In synergy with the operational recommendations, the utilization of the custom formulated silicone-based SuperWash brown stock wash-aid technology provided the catalyst needed to improve the drainage rates and increase the black liquor solids.

The environmental savings were also demonstrated in eliminating the use of additional water when the liquor solids are lower (e.g. 13 percent vs. 15 percent) and the subsequent energy required evaporating that water in the liquor concentrators (Figure 1).

CONCLUSION

As a result of the comprehensive technology program implementation, this customer was able to achieve significant financial and environmental savings, leaving them satisfied with the approach and expertise NALCO Water offered to help them address their total cost of operation (TCO).

	<u>Lbs./Hr. Dry Liquor Solids Processed</u>	<u>Lbs./Day Dry Liquor Solids Processed</u>	<u>Lbs./day Liquor Solids (55%)</u>	<u>Lbs./day Water for Evaporation</u>	<u>Evaporator Economy</u>	<u>Steam/Day Required for Evaporation</u>	<u>Steam Cost per 1,000 Lbs.</u>	<u>Cost / day to Evaporate H₂O</u>	<u>Cost / Year to Evaporate H₂O (350 operating days)</u>
13.0% Liquor Solids	65,000	1,560,000	2,836,364	10,440,000	4.0	2,610,000	\$5.83	\$15,216	\$5,325,705
15.0% Liquor Solids	65,000	1,560,000	2,836,364	8,840,000	4.0	2,210,000	\$5.83	\$12,884	\$4,509,505

Cost Analysis				
	From		To	Increase In Weak Liquor Solids
% Liquor Solids	13.0% Liquor Solids	<	15.0% Liquor Solids	<
	\$5,325,705	Annual Cost	\$4,509,505	Annual Cost
				2.0%
				\$816,200 Savings

Figure 1 – Economic analysis of SuperWash Brown Stock Wash-Aid program

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