

FirstCLEAR™ Raw Water Treatment Delivers 5% Increase in Machine Efficiency While Reducing Biocontrol Costs by 20%

NALCO Water
An Ecolab Company

CASE STUDY - PULP & PAPER

CH-1993



BACKGROUND

As one of the heavy users of water, the paper industry is dependent on the proper preparation of this raw material to consistently maintain production efficiency and meet sheet quality. By improving the quality and reducing variability in the incoming water, paper makers can increase the utility of water. One of the many sources of variability in raw water are microorganisms. When allowed to enter the paper system uncontrolled, bacteria can heavily impact the paper process by forming bacterial slime that can slough off and create defects into the final sheet, plug press felts and shower nozzles, reduce the efficiency of heat exchangers and contribute to sheet odor and asset corrosion, leading to lost production time, finished product defects and raw material spoilage.

CUSTOMER IMPACT

Improved operational efficiency by 5%

Consistent raw water quality with robust chemical program

Enhanced asset protection with improved chemical and machine compatibility

Provided the option to reduce water demand by 800,000 gallons by eliminating up to 4 boilouts to manage machine deposits

Eliminated chlorine gas cylinders



ASSETS



WATER

ECONOMIC RESULTS

Typical 1% OME improvement equal \$1 million in profitability

Optimized biocontrol treatment costs across process and water operations up to 20%

Helped avoid machine repair and felt replacement costs by a less chemically, stressed system

With the cost of water at \$1.50/1000 gallons, the mill could save \$1,200 per year



SAFETY

Lessen the risk of lost time incidents

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

SITUATION

A major North American paper mill treated river freshwater with gas chlorine. The treatment was intermittent and highly variable with swings in residual concentration ranging from 0.1 to 3.0 ppm resulting in the risk of under treatment, allowing microorganisms to enter the process. The program also saw periods of overtreatment, placing critical unit operations and chemical programs at risk.

As part of their current microbiological control program, several parameters were monitored by the mill including chlorine residual and microbial activity indicated by plated counts and adenosine triphosphate (ATP). The mill correlated these data points to machine efficiency as a function of lost time due to holes and breaks.

The mill was driven to improve its operational safety by eliminating the use of chlorine gas while reducing variability in chlorine residual. With over 80 years of experience in pulp and paper biocontrol, Nalco Water has seen that consistent control of microbial activity has been linked to reductions in holes and sheet breaks resulting in improved runnability. Nalco Water representatives reviewed the mill's current raw and process biocontrol programs to help improve their production performance and reduce operating costs.

SOLUTION

While there are many bacteria present in the incoming water, not all of them will cause problems in a production environment. During the assessment of the mill's water plant biocontrol treatment programs, Nalco Water utilized its patented Metagenomic Analysis Protocol (MAP) to quantify problematic bacteria in the treated water. MAP technique identifies DNA of specific organisms such as filamentous and nitrifying bacteria, which can contribute to deposit issues. For this mill, MAP identified deposit-causing bacteria across different unit operations (See Figure 1).

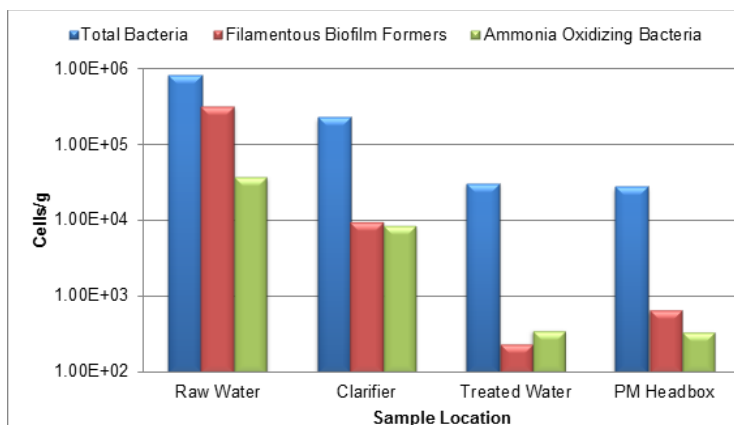


Figure 1: Specific-problematic bacteria were detected in the raw water plant and process plant samples.

By understanding what, where and how many microorganisms existed in the water, Nalco Water was able to quickly and effectively identify a customized biocontrol solution, a component of the FirstCLEAR™ raw water management program. FirstCLEAR program was implemented a chlorine gas replacement.

Nalco Water FirstCLEAR Program for raw water management consists of the following:

- **Expertise:** Assessment and identification of a holistic application strategy based on site audits and >70 mills of raw water experience.
- **Chemistry:** Comprehensive portfolio including both biocontrol and clarification chemistries such as OxiPRO™ Deposit Control Technology and PURATE™ solution.
- **Equipment:** Reliable and safety reviewed delivery systems.
- **Monitoring and Communication:** Key performance indicators measured with 3D TRASAR™ controller, enVision dashboard and Nalco Water's patented MAP technology to refine and sustain results.

RESULTS

Before Nalco Water's FirstCLEAR treatment, the target chlorine residual was met 60% of the time. During the trial, the target was met 93% of the time and chlorine residual variability was reduced.

After implementing the new program, incoming water consistently entered the paper process without contributing to microbial demand. Improved incoming water quality allowed for an optimized biocontrol strategy over the whole process. The impact on key process indicators was a reduction in microbial activity achieved by a lower oxidant dose to the paper machine's headbox.

The optimized treatment program lowered the biocide dose without increasing microbial activity over a 4-month period resulting in an overall biocontrol program cost reduction by up to 20%. A reduction in sheet breaks due to holes corresponding to a five percent increase in machine efficiency was observed after Nalco Water's raw water treatment for biocontrol was implemented (See Figure 2).

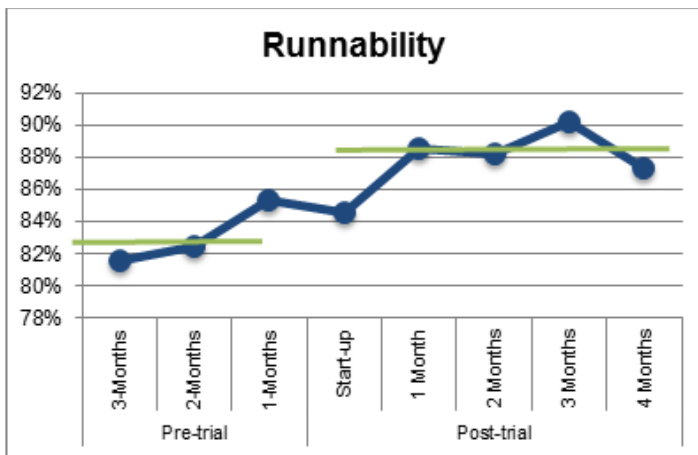


Figure 2: Machine efficiency increases from 83% pre-trial to 88% over the first four months of the trial

CONCLUSION

Nalco Water continues to meet paper industry demands by providing a holistic approach to water management. In this case, Nalco Water's FirstCLEAR™ program delivered a customized raw water biocontrol solution that replaced unsafe chlorine gas operation while improving machine efficiency up to 5% and reducing overall biocontrol costs up to 20%.

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