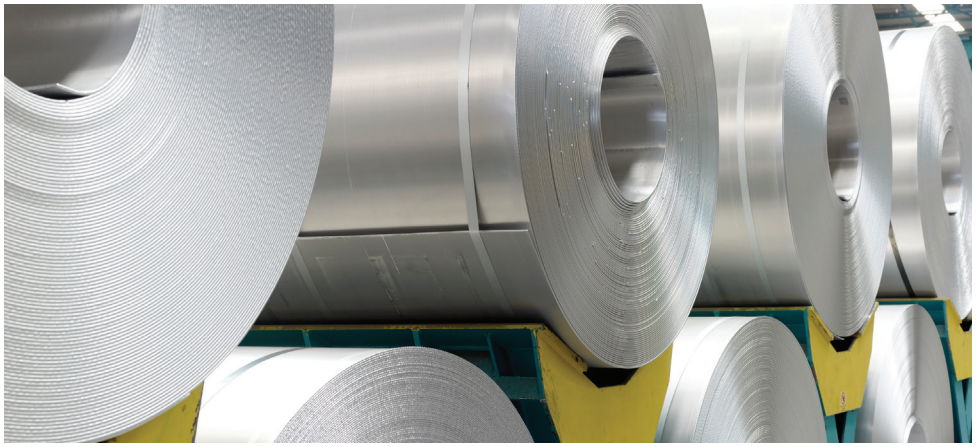
CASE STUDY

3D TRASAR™ Technology and Nalco Water coagulant help aluminum can manufacturer reduce sludge by 31% and save more than $57,200 per year

eROI℠ by Ecolab



BACKGROUND

The wastewater treatment plant (WWTP) of an aluminum can manufacturer is made up of physical-chemical (coagulation, flocculation and clarification) and biological processes (activated sludge). In the plant's physical-chemical process, lime was used as a coagulant, which produced a large amount of sludge (433.9 tons/year on average). The lime caused scaling in tubes and equipment, and the hardness concentration in the effluent was not appropriate for reuse.

In addition, fluoride, from hydrofluoric acid used for can washing, is a pollutant of greatest concern to the customer. The local regulation established a maximum of 10 mg F/L in the factory's effluent. To achieve fluoride levels below 10 mg/L, pH during the coagulation process must be controlled around 6.8.

The customer wanted to reduce the amount of sludge produced in the physical-chemical treatment and prepare the site for effluent reuse, so lime needed to be eliminated from the process. The effluent treated with lime presented high concentration of hardness (calcium and magnesium ions), as shown in Table 1.

Table 1 – Characteristics of effluent treated with lime

Substance	Concentration
Calcium (mg Ca^{2+}/L)	788
Calcium (mg $CaCO_3$/L)	2000
Fluor (mg F-/L)	10.04
Magnesium (mg Mg^{2+}/ L)	12.86
Magnesium (mg $CaCO_3$/L)	53
Silica (mg SiO_2/L)	10.6
Total hardness (mg $CaCO_3$/L)	2100

The coagulation and flocculation process is followed by inclined plate settler, where the flocs formed in the previous step are retained. After the

ANNUAL SAVINGS

WASTE

Reduced sludge volume by

134 tons

per year

COSTS

Decreased NaOH consumption by

39%

per year

TOTAL VALUE DELIVERED

Total savings of

USD $57,238 ANNUALLY

NALCO Water
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clarification step, the effluent goes to the biological treatment, where remaining COD and pollutants are removed. These structures were appropriated for Nalco Water's treatment program with the product Nalco 2.

SOLUTION

To provide good effluent quality in terms of hardness and fluoride, and reduce the sludge volume, lime was replaced by Nalco 2.

The Nalco Water team introduced 3D TRASAR™ technology to achieve the suitable pH and minimize variations during coagulation process. The NaOH dosage was linked to 3D TRASAR equipment, which received the pH value from a sensor installed in the coagulation tank and adjusted the flow rate of NaOH. This ensured the pH held steadily around 6.8. As the automation avoided significant pH variations, the 3D TRASAR technology also contributed to NaOH savings and cost avoidance.

RESULTS

After implementation of Nalco Water program, sludge generation at the plant was reduced from 433.9 tons/year to 299,8 tons/year, a 31% reduction. The NaOH consumption, originally 3.106 kg/m^3, was reduced to 1.897 kg/m^3 after the 3D TRASAR installation, a 39% savings. Therefore, the Nalco Water program and technology reduced sludge generation and NaOH consumption and provided an effluent with lower hardness, silica and fluoride concentrations.

Table 2 – Characteristics of effluent treated with lime and comparatively, Nalco 2

	Lime as coagulant	Nalco 2 as coagulant
Substance	Concentration	Concentration
Calcium (mg Ca^{2+}/L)	788	7.10
Calcium (mg $CaCO_3$/L)	2000	18
Magnesium (mg Mg^{2+}/ L)	12.86	4.846
Fluor (mg F-/L)	10.04	8.6
Magnesium (mg $CaCO_3$/L)	53	20
Silica (mg SiO_2/L)	10.6	< 0,030
Total hardness (mg $CaCO_3$/L)	2100	38

CONCLUSION

An effective change in coagulant type and the addition of 3D TRASAR technology provided savings of approximately USD $57,238 per year. Nalco Water chemistry helped reduce the customer's sludge volume and improve effluent quality in terms of hardness, silica and fluoride. The lower concentrations of hardness and silica made the effluent more suitable for reuse. The 3D TRASAR technology stabilized and controlled the pH, improving fluoride removal and saving NaOH.

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