

CLEANING UP THE EGG WASHING PROCESS

When a customer was faced with biological oxygen demand and high-water usage for their egg washing facility, CETCO engineers recommended the use of RM-10[®] clay-based flocculant to generate clear water that could be discharged directly to a POTW.



PROJECT DETAILS

Egg Washing Facility

LOCATION

Canada

PRODUCTS USED

RM-10[®] Flocculants

CHALLENGE:

A client in the egg washing industry, with facilities in south central Canada, had a problem: biological oxygen demand, or BOD, and high-water usage. This problem is pervasive in the food industry. Local and state regulations require companies to keep the BOD concentration below established levels. Anything above those levels result in a surcharge, which is calculated by the amount of water that the company uses.

There are two types of BOD: soluble and insoluble. Insoluble BOD is easier to remove than soluble BOD if you are able to precipitate them out of solution. Soluble BOD is more difficult to treat; it must be oxidized or provided with an active site or area where it can be adsorbed.

Our client faced both types of BOD and was incurring significant remediation costs. And with BOD levels in the range of 3,000 ppm to 4,000 ppm (even higher in some cases) and local regulations limiting BOD concentrations in its water to 300 ppm, it incurred a substantial penalty: \$86,000 per quarter, the result of untreated process water (or process water that had been treated ineffectively). At the same time, as part of its normal operations, it was tapping significant volumes of water – roughly 300 cubic meters per day, or 19 to 21 cubic meters per hour.

Calculating water costs for our client follows a straightforward formula: With client facing BOD concentrations of 3,000 ppm and the city limit set at 300 ppm, the cost is the difference in concentrations, multiplied by the volume of water discharged, multiplied by the cost of water (\$/kg):

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Cost =

- Concentration of BOD above the city limit regulation x
- Volume of water generated x
- \$/kg (set by the city)

For our client, the city cost per kilogram was \$1.17 and the allowable BOD limit was set at 300 ppm. Consuming 19 cubic meters of water per hour generated:

$$\begin{aligned}
 19 \text{ cubic meters/hour} & \times 24 \text{ hours/day} & = & 456 \text{ cubic meters/day} \\
 456 \text{ cubic meters/day} & \times 5 \text{ business days/week} & = & 2,280 \text{ cubic meters/week} \\
 2,280 \text{ cubic meters/week} & \times 12 \text{ weeks/quarter} & = & \mathbf{27,360 \text{ cubic meters/quarter}}
 \end{aligned}$$

1 cubic meter = 1000 L ; 27,360 cubic meters = 27,360 KL

Furthermore, client’s BOD levels average 3,000 ppm, the city limit is 300 ppm and the cost per Kilogram is \$1.17:

$$\begin{array}{rclcl}
 3000\text{ppm} & - & 300 \text{ ppm} & = & 2,700 \text{ ppm} \\
 2,700 & \times & (27,360\text{KL}/1,000) & = & 73,872 \text{ over limit} \\
 73,872 & \times & \$1.17 & = & \mathbf{\$86,430/quarter}
 \end{array}$$

The client approached us in an effort to reduce its overall costs, which were directly impacted by BOD levels and water consumption.

CETCO SOLUTION:

After assessing the client’s needs, our engineers recommended CETCO RM-10®, which effectively reduces BOD levels in wastewater.

RM-10 is a single step treatment process composed of a non-hazardous blend of naturally occurring bentonite, pH adjusting agents, polymers and other proprietary components, and offers superior adsorption capabilities of contaminants, including BOD.

CETCO’s line of RM-10 clay-based flocculants are available in granular, semi-granular, powdered and liquid varieties, and are especially suited to treat an array of industrial and municipal wastewater.

Application is generally straightforward: the product delivers a one-step removal of emulsified oil, heavy metals and suspended solids from wastewater streams by the following:

- Chemical components adjust the pH of the water to enhance the precipitation of metals and break oil emulsions
- Bentonite clay particles attract and encapsulate precipitated metallic ions



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- The polymeric portion of the formulation attracts remaining oils and suspended solids and then forms a floc, which settles to the bottom of the treatment vessel
- The bentonite clay and polymer work together to create a strong filterable floc, which encapsulates and contains heavy metals through a pozzolanic reaction while at the same time allowing the floc to readily release water, resulting in a drier sludge cake

The entire process is completed in just a few minutes, resulting in clear water that can be discharged directly to a POTW. The sludge and its encapsulated contaminants are highly resistant to leaching and can be generally disposed of as a non-hazardous waste.

Effective and Efficient:

In third-party testing, RM-10 can reduce BOD levels by as much as 84% in high flow applications. We therefore recommended its deployment to the client sites to reduce its soluble BOD.

Treatment was not simply “plug-and-play,” though. With the quality of wastewater at the client sites varying throughout the day, BOD concentrations also fluctuated commensurately. Therefore, our engineers needed to understand these changes to apply the proper treatment.

At our client’s facility, RM-10 treatment reduced BOD levels by 84% on average, or $.84 \times 3,000 \text{ ppm} = 2,520 \text{ ppm}$, resulting in a net BOD average of $3,000 - 2,520 = 480 \text{ ppm}$. The resulting cost savings was considerable:

480ppm	-	300 ppm	=	180 ppm
180	x	(27,360KL/1,000)	=	4,924.8 over limit
4,924.8	x	\$1.17	=	\$5,762.01/quarter

The client ended up paying \$5,762 per quarter rather than \$86,430, **a savings of \$80,668, and a net savings of 93.3% per quarter.**

Sustained Savings:

After more than six months and minimal process adjustments, the client continues to save more than 90% in water costs per quarter, the result of its application of RM-10 to its wastewater.