

# DAF Optimization Program Reduces Sludge Disposal by 46% at Dairy Overflow Facility

## CASE STUDY - FOOD AND BEVERAGE

CH-1503

### SITUATION

An eastern dairy overflow facility routinely sends excess fluid milk to an off-site production facility for processing into powdered milk, condensed milk/cream, and butter. The volume of processed milk varies significantly on a seasonal basis with the greatest demand occurring during the fall through spring period.

The facility's activated sludge wastewater plant has been on-line since 1985 with little modification or capital improvement. Wastewater passes through an activated sludge process where the pollutants, biochemical oxygen demand (BOD), total suspended solids (TSS) and fats oil and grease (FOG) are removed prior to discharge. The plant has historically experienced equipment and operator issues necessitating "emergency" control measures to ensure that permit limits were met. Since 2009, the plant's wastewater has been sent to the local publicly owned treatment works (POTW) allowing the plant to avoid the

capital outlay required to comply with new nitrogen limits mandated by the state for direct discharge to the environment via their NPDES permit (National Pollutant Discharge Elimination System).

New management at the production facility was interested in improving the process since, during peak production, there were still major problems in ensuring that permit limits to the POTW were met. Installation of a 1MM to 500MM gallon equalization tank and increased aeration estimated at more than \$500,000 in capital expense were being considered to resolve operational issues in the activated sludge wastewater plant. Standard operating procedures had been difficult to implement due to variable conditions including a variable COD load. In order to improve overall operation and reduce total costs of operation, a cross-functional Ecolab team was brought in to assess the plant and recommend a solution.

### CUSTOMER IMPACT

Sludge reduction of 46%

### eROI<sup>SM</sup>



### ECONOMIC RESULTS

\$200,000 savings in sludge hauling costs

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

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## SOLUTION

The cross-functional Ecolab team conducted a thorough plant assessment including system mass balance and modeling, chemical screening, and a review of plant operating parameters. A number of opportunities were discovered to reduce total cost of operation. Krofta equipment engineers and Nalco Water experts were utilized to identify potential improvements. Challenges identified during the assessment included high flow rates during peak production periods, low dissolved oxygen resulting in a troublesome biopopulation, a poorly operating primary dissolved air flotation unit (DAF) which resulted in poor settling of biomass and excessive carryover of sludge solids, high labor costs due to "emergency" episodes, and operators reacting to upsets rather than analyzing data to prevent them.

Plant management was eager to improve the operation and reduce both operational and capital costs. The operators were hopeful that improvements would result in a more predictable treatment method and fewer emergency situations to handle.

The cross functional Ecolab team recommended a solution that included the DAF Optimization Program, operator training, and repair of equipment. The DAF Optimization Program combines

Krofta engineering expertise to improve DAF performance through mechanical troubleshooting with wastewater expertise to provide best in class chemistry and application knowledge. The cross-functional Ecolab team improved DAF performance mechanically by implementing recommendations from Krofta equipment experts, and chemically by adjusting pH with sulfuric acid and introducing Nalco® 8102 PLUS coagulant and NALCLEAR® 7767 flocculant with appropriate applications techniques. The team repaired and re-commissioned sludge loading equipment that enabled the plant to load higher solids sludge on the haul-off tank trucks. Operators were trained to properly monitor DAF operations and respond to upsets

## RESULTS

Following the DAF Optimization Program, sludge volume disposal was reduced from 30,000 tons per year to 16,000 tons per year, a 46% decrease. This reduction in volume resulted in a \$200,000 reduction in sludge hauling costs. With plant performance dramatically improved, a full time employee was no longer required to handle emergency situations resulting in an additional \$75,000 in savings. Specialty chemical costs increased from \$10,000 to \$120,000 annually, since no polymer was being added to the primary DAF prior to the audit. Overall operating expense for the

plant was reduced by \$155,000.

Prior to chemical addition, dissolved oxygen (DO) was rarely above 0.5 ppm and MLSS were 6000 ppm and greater. The effluent limits for TSS and BOD of 300 ppm each were close to permit levels. Following the DAF Optimization Program, the DO was consistently held above 1.5 ppm. MLSS were in the range of 1100 ppm to 3200 ppm. The clarifier effluent TSS was reduced by greater than 80%.

## CONCLUSION

The cross-functional Ecolab team enabled the customer to achieve desired system performance and TCO reduction goals. Troubleshooting at the plant has improved since the link between the production plant and the wastewater plant has been established. By completing the plant assessment and mass balance while evaluating various operating scenarios, the cross-functional Ecolab team demonstrated how total cost of operation can be reduced by optimizing the DAF operation to reduce sludge hauling costs. The local sales engineer leveraged the expertise of other Ecolab divisions to build a cross functional team that resolved key issues for the customer. Today, this customer views Ecolab as capable of providing integrated solutions through teamwork and implementation of best practices.

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