Sweetening the Wastewater

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Many food and beverage manufacturers produce wastewater that is high in organic content, and must therefore be treated before it is discharged into streams or into the municipal sewer system. Strict regulations protect the environment and the public water treatment systems from being overloaded and degrading the water quality.

L&S Sweeteners manufacture a variety of liquid sweeteners for the food and beverage industry. The sweeteners are delivered in tanker trucks which must be cleaned after each shipment, according to USDA requirements. The sugar residues that remain in the tanker trucks are washed out with high pressure water, which is then collected in floor grates and stored in a 25,000 gallon holding tank. In the past, this cleaning process was a major contributor to the wastewater stream from the manufacturing plant. This water contained high concentrations of sucrose, fructose, molasses and honey, all of which degrade the wastewater quality by adding organic material. High levels of organic material can lead to a drop in the oxygen levels in bodies of water such as rivers and lakes, and can cause the death of aquatic animals and vegetation. Biological Oxygen Demand (BOD) is one of the main measures of water quality, and is strictly enforced on discharge of wastewater to the municipal sewer systems.

L&S operated a wastewater treatment plant in order to remove the sugars from their waste stream, but despite their best efforts, it was not able to clean the water to the level required by water quality regulations. The effluent repeatedly exceeded the maximum allowed levels of 500 PPM of BOD5 and 200 PPM of Total Suspended

Solids (TSS). As a result, L&S incurred charges imposed by regulators enforcing their discharge permit. These additional expenses, which were completely avoidable, caused a serious drain on the company's bottom line.

L&S realized that they needed a more comprehensive solution to the challenges of their wastewater treatment, one that would achieve several goals. First, they wanted to decommission the existing treatment plant so that they would not have to deal with any more permitting and regulatory burdens, while also avoiding the charges they were incurring. Second, they sought to reduce the amount of wastewater generated in their facility and reclaim the water from the rinsing process for other processes in the factory, thereby also reducing their use of costly drinking water. Finally, they wanted to reclaim the sugars in the waste stream and turn them from a liability into a profitable after-market product.

L&S turned to CASTion Corporation, a company that specializes in water treatment solutions based on Controlled Atmosphere Separation Technology (CAST), an advanced application of the principle of vacuum flash distillation. The central component of CAST systems is a distillation chamber (still), where heated effluent is sprayed through an atomizer into a low pressure atmosphere, causing the water to evaporate from the effluent. The effluent becomes highly concentrated, and in the case of L&S, the result is sugar slurry, water with high levels of sugar. Additional contaminants collect at the bottom of the still, and are removed from the concentrated effluent. The water vapor is collected at the top of the chamber and condensed into water of much higher purity. After treatment in the CAST system, the effluent is separated into high purity water, and a high quality concentrated solution of the process chemical, which can be reused or resold.

In a vacuum, the boiling point of liquids is lowered, so the water evaporates at a much lower temperature, typically 100-140 °F, and the heat required to generate the vapor is approximately 1040 Btu/LB of vapor. These low temperatures allow CAST systems to be manufactured with engineering plastics and simple technologies. In contrast, high temperature distillation requires specialty materials and complicated components, such as Freon-based refrigeration systems, or high pressure steam boilers. Additionally, CAST systems can operate on low temperature heat sources, such as hot water heaters, low pressure steam or waste heat supplies. Operating costs are thus lowered through savings on fuel, and maintenance is reduced through the use of simpler, more reliable technologies.

The CAST system installed at L&S has a 6,500 gallon per day through-put, with a concentrated sugar slurry and a distillate (clean water) as the final products. The water from the tanker cleaning process is pumped to the 25,000 gallon holding tank located in the rear of the process building. Stabilized wastewater from the holding tank is filtered, transferred to a carbon dioxide degassing tank then delivered to the CAST system. The sugars are concentrated in the CAST system and contain 60% brix liquid sucrose and are sold locally as a silage enhancer. The higher sugar content of the feed promotes increased milk production in dairy cows.

CASTion Corporation provided L&S with a solution that addressed all of their goals. The treatment of wastewater is no longer necessary; thus the treatment plant was

decommissioned as requested, all of the fines are avoided, and no discharge permit is required. High quality water is reclaimed from the waste stream and can now be utilized in other applications in the plant, drastically reducing the amount of fresh water needed. The sugars are removed from the wastewater, converting them from waste to concentrated sugar slurries at up to 60 Brix, a profitable after-market product. Finally, the cleaning services for the tankers can easily be expanded and are now offered to other companies, generating an additional revenue stream for L&S.

For more information, please visit www.castion.com *[1].*

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