FOOD PROCESSING
SPECIAL REPORT

Understanding Unique Wastewater Issues for the Food & Beverage Industry

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CONTENTS

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Understanding Food and Beverage's Wastewater Solutions

From simple to sophisticated, many wastewater solutions are available to food and beverage processors.

Kevin T. Higgins, Managing Editor

Water treatment is not a core competency in food and beverage production. When manufacturers think of it at all, it's usually because circumstances have conspired to make it too big a problem to ignore.

That moment arrived two years ago for Oland Brewery, when its wastewater discharge threatened to overwhelm the Halifax municipal treatment plant and force the Nova Scotia city to release water with levels of biological oxygen demand (BOD) and total suspended solids (TSS) into Halifax Harbor that would exceed national and provincial limits.

To build up a reserve if they were forced to upgrade the municipal plant, Halifax officials served Oland notice that surcharges would quintuple to almost $1 million annually, based on then-current BOD and TSS levels.

With a lineage dating to 1867 and 110 years on its current site, Oland Brewery is part of the fabric of Halifax and takes community stewardship seriously. "It probably would have been cheaper to pay the surcharge," allows Wade Keller, corporate affairs-Atlantic for Labatt Breweries of Canada, which acquired Oland in 1971 (the Oland family maintains ownership of Moosehead Breweries Ltd. In Saint John, New Brunswick). Instead, the brewery is investing $13 million in an anaerobic digestion system that will eliminate surcharges and also generate enough methane to meet 5 percent of the natural gas demand for plant boilers. Commissioning should begin in December.

Labatt is owned by Anheuser-Busch InBev, so brewery engineers were able to draw on the expertise of corporate engineers in Toronto and St. Louis, the latter of which have overseen the construction of 10 biogas reactors at A-B breweries in North America. Still, outside expertise was necessary. ADI Systems Inc. in Fredericton, New Brunswick, was retained to wedge the reactor, sludge bed and gas drying & polishing equipment into a footprint that measures little more than a tenth of acre.

"When you can't go wide, there's only one other way to go," observes Jose Molina, an ADI process engineer. Six tanks constitute the reactor, the tallest of which stretches 69 ft. high. With their polished steel skins, they could pass for beer storage tanks to the casual passerby.

A brewery's waste stream isn't particularly strong in terms of BOD, relative to other beverages, although Oland's is stronger than most. Reuse of clean-in-place final-rinse water and other water-reduction efforts helped cut consumption 15 percent.

A common mantra in water treatment circles is "the solution to pollution is dilution." Oland moved in the other direction, but it wouldn't have it any other way. "In Canada, getting water isn't a problem, but around the world, it is," Keller points out. "Our company has a commitment to water conservation."

Old problems, new solutions

Among water-treatment companies with a food and beverage focus, the most common anaerobic installations are dairy operations — fluid milk, cheese, ice cream, yogurt, etc. It's true for Oklahoma City-based World Water Works Inc. and ADI, which has installed at least two dozen anaerobic reactors at dairies. GE Water &

Process Technologies, Trevose, Pa., is eyeing that segment, as well, although much of its work to date has involved sugary streams from beverage manufacturers.

Oland's space constraints were on the extreme end, but food manufacturers aren't land barons, and space typically is a restriction, both inside and outside the four walls. GE has developed a soup-to-nuts portfolio of treatment options. The membrane bioreactor (MBR) is "our premier product and a game changer compared to gravity separation," says Paul Schuler, region executive, the Americas-engineered systems. It also is a relative space miser.

"We've been doing beverage MBRs for years because their waste streams have super-high strength," says Schuler. Systems can be either aerobic or anaerobic. The trend is toward the latter, because they not only generate energy, they reduce energy inputs compared to aerobic reactors. Less permeable tank liners and noncorrosive screws distinguish the anaerobic systems; the membranes themselves are the same.

GE's showcase MBR project was Frito-Lay's Casa Grande, Ariz., facility. Water recovery and reuse was a higher priority than biogas, and a 15-step process that includes low pressure reverse osmosis, starch recovery and activated carbon added complexity. Since project completion in 2010, the system has returned three-quarters of intake water back to the plant as process water – however, at an estimated cost of $13 per 1,000 gallons, only plants in the most water-stressed regions might consider undertaking such a project (Casa Grande is in the Sonoran Desert).

Most food processors are more interested in staying within the COD, BOD, phosphorous, nitrogen and TSS discharge limits set by municipalities and regulatory authorities. When conventional solutions are inadequate, they usually can turn to a supplier with an innovative new solution, often in a pre-engineered, skid-mounted format.

Daniel Dair, regional technical manager with World Water Works, says high organic loads can be a problem in Dissolved Air Flotation (DAF) systems. "They never build them big enough," he complains, resulting in discharges that exceed permit limits. His firm has engineered a hydrocyclone that separates fats, segregating out lighter fractions and using the heavier ones to settle particulate in the DAF.

Prefiltering the waste stream is another option. Spiral Water Technologies Inc. in San Francisco is touting its skid-mounted self-cleaning mechanical filter. Particles in the 10-100 micron range are separated from inlet water, and a motor-driven spiral brush runs across the screen 10 times a second, allowing it to operate without a backflush.

"Sometimes the purge is an asset," points out Ashwin Gulati, president and CEO. He recently demonstrated the unit for a processor of pomegranate juice. The firm was conveying a juice slurry by truck to a centrifuge to lower pulp content from 10 to 1 percent solids. His mechanical filter accomplished the job in one hour on site, in a single pass. Next up: a brewery trial.

A simple solution that doesn't cost millions is preferable to a sophisticated energy- or water-recovery solution, but Oland has no regrets. Although its 937,000 bbl. finished goods capacity is dwarfed by its corporate cousins in St. Louis and elsewhere, the waste value stream is sufficient to eventually generate a return. In fact, GE's Schuler estimates any brewery producing 300,000 bbl a year is a candidate for a biogas system. That's more than all but a handful of craft breweries. A group of microbreweries in Bend, Ore., is considering pooling their waste and treating it in a cooperative MBR.

Regardless of whether those discussions bear fruit, food processors of all sizes can pick and choose from a wide range of solutions to a problem they wish would just go away. ◻

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Benefits of Industrial Wastewater Treatment Using Direct Steam Injection

Pick Heaters offers unique advantages to the food and beverage industry for industrial wastewater treatment.

Q&A with Mark Brueggemann, National Sales Manager of Pick Heaters, Inc.

Tell us about Pick Heaters recent involvement in the Brewing Industry.

Over the past few years we have seen an increasing demand for using Pick DSI (direct steam injection) technology in treatment of industrial wastewater. This application is found in various types of food processing plants, however the brewing industry is steadily growing. As many of the more successful craft breweries expand operations they need to address their wastewater management.

As their business grows, breweries can no longer simply release effluent to the sewer system. Many facilities have implemented Anaerobic Treatment Systems to handle the increase in wastewater discharge. The amount of solids and organics sent for offsite treatment is greatly reduced. The byproduct of the digester process is biogas that can be turned around and used as a power source for the plant. Brewers are by nature innovative thinkers, which is evident in how they have turned this challenge into an environmentally responsible and cost effective solution.

So where does the Pick Heater come into play?

Wastewater temperature is one of the important factors in the anaerobic process. A stable year-round temperature range between 86°F – 104°F is critical to optimize bacteria growth. This requires a constant and reliable sludge feed temperature. The Pick Heater is used to heat the wastewater stream, precisely maintaining temperature as it is fed to one or more digesters. We have also installed heaters to trim, or make up heat where plate type heat exchangers are used and tend to come up short on temperature.

What sets Pick apart in these applications?

Our heater is designed around low-velocity mixing. Steam is dispersed across a multiple orifice injection tube where it is instantly absorbed by the liquid. The heater body incorporates simple, but effective helical mixing of liquid promoting complete absorption of steam within the heater housing. The open design of the Pick Heater

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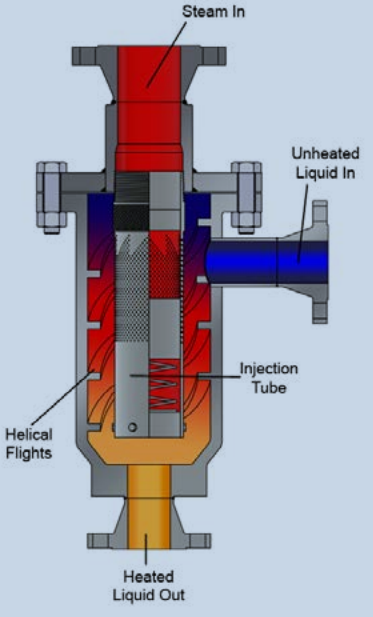

allows for handling of slurries or solids while incurring minimal pressure drop. There are no tight openings or shearing devices that can cause plugging.

Is the application of heating wastewater something new for Pick Heaters?

Not at all. It is important to know that the application of a Pick Heater goes well beyond the basic water heating process. While Pick has been the "go to" method for over 70 years in providing hot water solutions for the Food Processing Industry, the Pick design is very efficient in handling slurries or water with suspended solids. This opens us up to various other applications such as starch and in-line product cooking, heating of skimming in DAF recovery processes, as well as wastewater streams.

What other Industries has Pick been used in wastewater treatment?

This application is definitely not limited to the beverage industry. Cheese processors will use Pick to heat wash water with high whey concentrations. We have worked with meat processors to handle livestock waste, up to 8% solids.

Pick Heaters, Inc. works with both turn-key system providers as well as the end user. We review the specific and often unique requirements of the customer and provide the best solution. This is basically the same approach taken for years and what makes Pick Heaters the Leaders in the industry. ☐

Dependable and Energy Efficient Direct Steam Injection Heaters

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Cutaway View of Steam Injection Heater

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