



TOPIC: NEW BREWERY & EXPANSIONS, ENGINEERING, ENVIRONMENT

FOCUS ON BREWERY WASTEWATER CAN SAVE TIME, MONEY AND DISRUPTION

Water is a significant component of the brewing process. It makes up more than 90 percent of most beers and is used extensively in brewery cleaning and maintenance processes. A panel of experts at the recent Master Brewers Association of the Americas conference in Calgary, Canada shared insights on how to get more out of this precious resource by emphasizing the need for breweries to develop a thoughtful wastewater plan.

Engrain wastewater cost reduction into your culture

Two panelists from First Key, discussed methods that can be used to mitigate solids from entering wastewater drainage lines and reduce water usage throughout the brewing process.

“The most important element is not technical,” said Rod Waite, a process engineer and head of First Key’s engineering services practice. “A successful wastewater program should be engrained in the brewery’s culture. It has to start at the top, with management making it a priority. Then each team member has to be accountable for properly executing the details of the program...and rewarded when that happens.”

Waite and Mark Benzaquen, a former brewery owner who serves as a lead consultant for First Key, walked through the main steps of the brewing process and discussed some common industry best practices for diverting solids away from wastewater and improving water usage efficacy at each stage, including:

- **Milling and mashing.** Many breweries can safely collect malt dust from the milling process and re-introduce it into the mash to improve extraction. Malt dust that can’t be collected should be disposed of as a dry matter and not hosed down the drain

- **Lautering.** Once brewers complete the run off, or transferring wort from the mash or lauter tun to the boil kettle, they are often left with unused or “weak wort”. These last runnings could be collected and reintroduced into the brewing process as foundation water in the mash or lauter tun. Here again, this helps reduce the amount of solids in the wastewater lines. Spent grain from the mash can be disposed of in many ways. Some breweries use mesh mash filters to extract more wort from the grain. Others use the spent grain for food by-products or ship it to farmers for feed. The key is to minimize moving these solids through the wastewater system.
- **Wort Boiling.** After whirlpooling boiled wort, most brewing systems will retain trub at the very bottom of the brew kettle. The trub contains a lot of usable wort that can be captured and re-utilized in the brewing process, while the trub solid matter can be disposed of as a solid waste, which will avoid it going down the drain and further contributing to waste water loading and, therefore, the waste water treatment costs involved.
- **Fermentation.** After the yeast has done its job and any dry-hopping is complete, the goal is to transfer as much good beer as possible to the maturation tank for aging. Many brewers use a centrifuge to separate the solids and improve the yield on the beer being transferred. Excess yeast and hop slurry can then be collected and diverted from the drain. Yeast and hop slurry have a huge impact on the waste water load, and the costs involved in treating the waste water.
- **Filtration.** Solids captured when filtering beer being transferred to the brite tank can often be composted, offered to farmers (of certain animals like pigs, not rudiment animals like cows) or even serve as by-product for the production of bricks.
- **Clean in place.** CIP protocols should be designed to optimize water and chemical usage. For example, brewers can segregate caustics for low-soil and high-soil loading to get the most out of those chemicals. Also, using shorter periods of high-intensity “burst rinses” that use jets for impingement rather than spray balls can be more effective than low-flow continuous rinsing in terms of the amount of water used to rinse out the vessel. Post-rinse should also be recovered for pre-rinse. This further saves on amount of water used during the vessel cleaning, which in turn results in additional water cost savings.
- **Packaging.** This step typically includes significant water usage and, as a result, breweries can often find efficiencies. In addition to optimizing water usage during the pre-fill cleaning process, there may be opportunities to capture residual beer from the filler or beer supply piping, reducing overall waste.

“The key overall is to be thoughtful about water usage and the wastewater approach at each step of the brewing process,” said Waite. “There are plenty of opportunities to make incremental improvements...and over time those improvements can lead to noteworthy benefits.”

Wastewater treatment: Find the right solution for your brewery

Jeff VanVoorhis, vice president at the engineering and construction firm Symbiont, provided perspectives on brewery wastewater treatment programs. VanVoorhis said there are typically two drivers behind the need for a wastewater treatment program: It is being mandated by a municipal authority, or it is in the brewery’s financial interest.

No matter what is behind the need to implement a wastewater treatment program, VanVoorhis emphasized that there are no off-the-shelf solutions. “Each situation is unique, so I encourage brewers to do the necessary leg work up front before landing on a solution. Collect information and engage helpful resources, such as trade groups. Create a plan that makes the most sense for you; don’t simply mimic what others have done.”

He also noted that many breweries do not prioritize wastewater planning because municipal or regional authorities are not forcing them to make changes. However, that can change quickly. “Just because you’re flying under the radar,” said VanVoorhis, “doesn’t mean you’re home free.”

It’s not a matter of if, but when

Bruce Lish, a veteran brewer from New York, offered a number of practical experiences related to wastewater treatment. Lish emphasized that complying with local municipal water authority regulations is a must in today’s environment. “It’s no longer a matter of if the water authority will look into how we treat wastewater, but when,” he said.

Lish discussed a variety of wastewater-related situations that resulted in significant issues for breweries, including:

- A brewery that complied with the initial water authority assessment but was reassessed after it expanded. The result: the brewery needed to install a \$300,000 treatment program to stay within compliance.
- A 10-barrel brewery opened in the early 1990s that enjoyed early success. After building a new brewery in another part of town to meet demand, the owners installed a complete organic wastewater pre-treatment plant. However, regional authorities up for constant changes to the pre-treatment plant. The brewery, which was not prepared to make the needed investment up with changing local requirements, ultimately closed.

- A brewery that operated a 7-barrel brewhouse for years in a downtown area without intervention from local water agencies. It then opened a production facility in the suburbs, operating without any issues. More recently, the brewery relocated to downtown, rehabilitating a derelict building. However, the local sewage authority, now more aware of craft breweries, made sewage treatment demands. The owners could not install a treatment plant on site because all of the space was being used for brewing operations. As a result, to continue operating, the brewery came to an agreement with the sewage authority to pay a surcharge assessment of \$2.25 per barrel of beer produced.

Lish reinforced the same key point VanVoorhis emphasized. The best way to avoid these pitfalls, he said, is to create a thoughtful plan that meets the needs of the brewery and the municipality. That includes working with the right contractors and implementing a system that will grow with the brewery.

Often, Lish added, a simple pH adjustment to the effluent wastewater stream is all that's required to meet the requirements of local authorities. The key is to be prepared. "Always have a plan ready to review with those entities that have oversight," noted Lish.