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New craft brewery wastewater treatment system saves surcharge costs and frees up municipal capacity

By Andrew Amiri, Neil Sosebee and Derek Davy

Over 4,500 licensed craft brewers are revitalizing small towns across North America, with revenues estimated at more than CDN\$30 billion per year. As one of the fastest growing sectors of the food and beverage industry, small breweries are supporting local economies, creating jobs and contributing to tourism. At the same time, their wastewater is creating a challenge for aging wastewater treatment infrastructure.

It is common for craft breweries to create five to ten times more wastewater than the beer they package and sell. The impact of this on a wastewater treatment plant can be equivalent to 10,000 - 20,000 people. For most small towns, the municipal plant is not designed to handle that much load. Municipalities are faced with the difficult decision of supporting growth in a local business or imposing fines to cover the cost of treating this high strength wastewater.

In 2015, the Ontario Ministry of Agriculture and Rural Affairs, through the Bloom Centre for Sustainability, engaged Econse Water Purification Systems to design a wastewater treatment system that could meet the specific needs of the craft brewing industry. After pilot testing at four craft breweries in Ontario, Econse introduced their Brü Clean System at the recent Ontario Centres of Excellence – OCE Discovery conference in Toronto.

Brü Clean is a modular, chemical-free system designed for easy installation and maintenance, making wastewater management simple and efficient for craft breweries. It overcomes a variety of challenges in this sector, such as:

- Extremely limited space in production facilities to install treatment equipment.
- Limited knowledge/experience of wastewater treatment and water reuse by brewery staff.
- Limited experience with best practices in water conservation and wastewater management.



Econse has developed a specialized wastewater treatment process for breweries, which utilizes a PeCOD analyzer to determine BOD levels.

- High operating costs due to chemicals, energy consumption and the need for highly skilled operators.
- High water-to-beer ratio.
- High capital expense.

The Brü Clean System removes solids, yeasts, phosphorus and nitrogen from the wastewater stream by integrating several processes. An equalization tank balances out extreme spikes in pH, suspended solids, and biochemical oxygen demand (BOD) from brewing and cleaning operations. This provides reasonably consistent water for treatment in a proprietary multi-treatment module (MTM). The chemical-free MTM eliminates >95% of suspended solids and removes up to 60% of dissolved BOD and nutrients.

After processing in the MTM, the wastewater moves into the bio polish unit, which combines aerobic and anaerobic biological digestion in a compact, above-ground process. Treated water can then be safely discharged or collected for reuse in the facility.



The chemical-free solution helps cut rising fees for water and wastewater, reducing the added cost of treatment chemicals and improving water consumption and environmental impact. It also helps municipal wastewater treatment facilities from being over-burdened by brewery wastes.

One of the most difficult challenges that Econse had to overcome in designing the system was the wide variation in wastewater throughout the craft brewing production cycle. This variation is evident in the BOD, which ranged between 3,300-48,000 ppm.

Since the standard lab test for BOD takes five days, the wastewater is long gone by the time results are returned. In addition, the presence of yeast and certain chemicals in the wastewater can cause false and inconsistent results.

Instead of relying on the standard BOD lab test, Econse began using a Pe-COD® chemical oxygen demand (COD)

	REGULATION (mg/l)	Average Before Treatment	Average After Treatment	Percent Reduction (%)
BOD	300	6900	99	98-99%
TKN	100	190	23	88%
TP	10	93	2.6	97%
TSS	350	5400	35	99%
pH	6 to 8	5.4	7	Balanced

Average treatment results of the Econse process.

analyzer by MANTECH. It has recently been approved by the Ministry of the Environment and Climate Change (MOECC) as a green and fast method for measuring COD. The MOECC Method E3515, based on the PeCOD technology, is now used for COD analysis by the MOECC Laboratory Services Branch. It generates results in 15 minutes through the use of UV activated TiO₂ (titanium dioxide) oxidation and an internal electrode, by directly measuring electron transfer. Econse found very good correlation between PeCOD

COD readings and BOD lab tests.

The speed of the PeCOD COD method made it a valuable tool in designing the Brü Clean System and optimizing wastewater management in the breweries. It has allowed Econse to develop a system of best practices for brewery personnel to follow, which has actually helped reduce the amount of wastewater for treatment by up to 75%. This directly translates to a smaller footprint and less equipment for the brewery.

Econse now offers a specialized lab package, just for craft brewers, which in-

cludes the PeCOD as a core piece of technology. Brewers are finding this new technology to be an indispensable window into their operation, which helps them to maintain compliance with municipal wastewater discharge requirements.

Andrew Amiri, Neil Sosebee and Derek Davy are with Econse Water Purification Systems.

For more information on the Brü Clean System, visit www.brucleansystem.com

For more information on PeCOD analysers, visit www.mantech-inc.com

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