Oregon Applied Sustainability Experience Internship Program:
Craft Brew Alliance & Widmer Brothers Brewing

Oregon Sea Grant and the Oregon Department of Environmental Quality developed the Oregon Applied Sustainability Experience Internship Program to link students with businesses to conduct reesarch focused on source reduction through water and energy conservation, pollution prevention, life cycle assessments and toxic use reduction.

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Company Description

Widmer Brothers Brewery, a pioneering Pacific Northwest craft brewer established in 1984 and located in Portland, OR, is part of Craft Brew Alliance (CBA), the seventh-largest craft brewing company in the U.S. CBA's portfolio includes Redhook, Widmer Brothers Brewing, Kona Brewing Co., Omission Beer and Square Mile Cider Co. and delivers their products worldwide. Their current brewery footprint allows CBA brands to be brewed and shipped closer to their market, reducing shipping costs and emissions. Widmer Brothers hosted the OASE intern and employs about 200 people in their Portland location, with production running 24 hours a day, five to six days a week.

Project Background

CBA's 2017 project focused on performing a complete engineering study around major wastewater improvements, and included: diverting yeast to waste liquid tanks, spent grain dewatering, and increased solids monitoring.

In a brewery, waste beer, wort, yeast, or grains enter the wastewater system and contribute to two regulated pollutants: Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS). Per the brewery's industrial wastewater permit, CBA is subject to the extra strength sewer surcharge, which is applied to each gallon discharged based on the sampled concentration of BOD and TSS. Increased BOD and TSS levels lead to significantly higher surcharges. The OASE intern project explored ways to prevent high BOD and TSS waste from going down the drain, through both cost-effective, low down-time methods and building a proposal for capital expenditure projects.

Incentive to Change

The EPA identified food processing and manufacturing as a national emphasis area for 2017-18, targeting water and energy reduction. CBA is committed to continual process improvement, water conservation and sustainability which led them to apply for the OASE internship to support that emphasis. Reports generated by the OASE intern will be a useful reference and training tool for current employees and new hires.

Summary

This project reduced 60 percent (6,000 pounds) of discharges of Total Suspended Solids, 11 percent (10,000 lbs) of Biological Oxygen Demand, and over $150,000 dollars saved annually, by identifying behavior-based changes and equipment to keep high strength waste from the drain, as all three projects, including the capital investments, were completed post-internship.

Solutions

Yeast Tank Overflow

This project started with identifying all streams entering the waste liquids tank, with a history of overflowing in the basement of the brewery. One of the issues that faces the brewery is that it has gradually expanded over the years with constant small additions and modifications. It is only an intermediary tank that is pumped into a large waste liquids tank across the street and the pump has proven to not always be able to keep up with the rate of liquid going into the tank, which causes spills of very high strength waste to the sewer drains in the floor. It was found that packaging occasionally sends a dump of about one or two barrels (31 gallons per barrel) of beer whenever they switch products and the brewers would send variable amounts, up to several barrels from a variety of operations, including the initial pump out of fermentation tanks that is full of dead yeast and hops. The intern explored several options and recommend that by improving communication and coordination between brewing and packaging, large, concurrent dumps to the tanks will be prevented and therefore reduce overflows of high-strength waste yeast into the wastewater system. Since the discussion with the departments, there hasn't been a single overflow from the waste yeast tank.

Spent Grain Dewatering

The second project was researching diversion options for liquidcollected from spent grains. The water content in spent grains are high after being separated from the wort and must be further dried before being blown into the storage silo for shipping. This is done using a dewatering screw and a spinner.

The liquid from the dewatering system is turbid and discharged to the wastewater system. It was tested and found to have a BOD of about 55,000 mg/L and a TSS concentration of 38,000 mg/L. The intern also measured the flowrate and determined that approximately 30 ccf per month of liquid was discharged and that CBA was paying approximately $160,000 every year to discharge this extra strength liquid. The intern recommended that CBA pump this waste stream to the waste liquids diversion system, leading to a very fast return on investment and providing CBA monetary savings and pollution reduction.

Solids Monitoring

A third, minor project investigated TSS and BOD monitoring equipment that would be used to collect data on the wastewater discharge stream. CBA wanted to know precisely when and why high strength effluent was discharged. The intern explored in house lab testing and purchasing options and recommended a solids sensor that could be installed for real-time remote readings from the discharge line, as well monitoring equipment for the brewery's QA lab.

Toxicity of Defoaming Agents

The intern also investigated defoaming agents used in the brewery used to reduce the foam in waste yeast and waste beer for efficient pumping. The research revealed that the current food-safe defoaming agents appear to be relatively non-toxic and have a low environmental impact.

Summary of 2017 OASE intern recommendations for Widmer Brothers Brewing

Recommended P2 actions	$		Environmental Results	Status
	Cost to implement	Annual savings		
Avoiding Yeast Tank Overflow	$0	$240,000	4 consecutive BOD/ TSS measurements down by 30%+	Implemented
Spent Grain Dewatering	$30,000	$150,000	5 tons BOD and 3.5 tons TSS	Recommended & Installed
Solids Monitoring	$6,000	N/A	Potential to track and elimiinate problematic behaviors	Recommended & Installed

Host Business Representative & Project Manager:
Julia Person, Sustainability Manager
In partnership Oregon Sea Grant and the Oregon Department of Environmental Quality