

More beer, less yuck factor

Craft beers made with effluent help spread the water reuse message

Utilities and municipalities battle to overcome the yuck factor associated with using wastewater effluent for both nonpotable and potable water supplies. Now they have added a new weapon to their arsenal: craft beer.

In Wisconsin, wastewater engineer Theera Ratarasarn created an American wheat ale called, Activated Sludge. Ratarasarn, who works for the Wisconsin Department of Natural Resources, used effluent from the Milwaukee (Wis.) Metropolitan Sewage District as his water source.

Meanwhile, Clean Water Services (Hillsboro, Ore.) started a partnership with the Oregon Brew Crew (Portland, Ore.) to create the Pure Beer Project to help promote water reuse. Because of the project, more than a dozen brewers have used Clean Water Services effluent to produce home brews.

Finding the right recipe

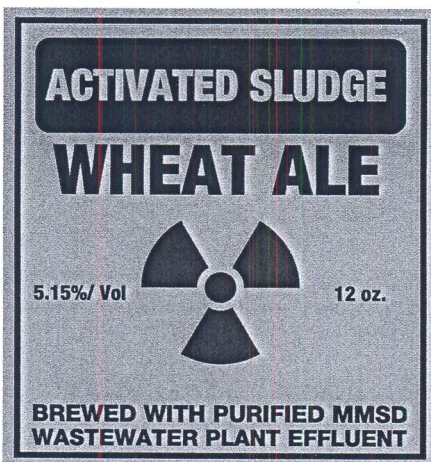
Ratarasarn had been home brewing for 2 years before he tried his hand at home

brewing with effluent.

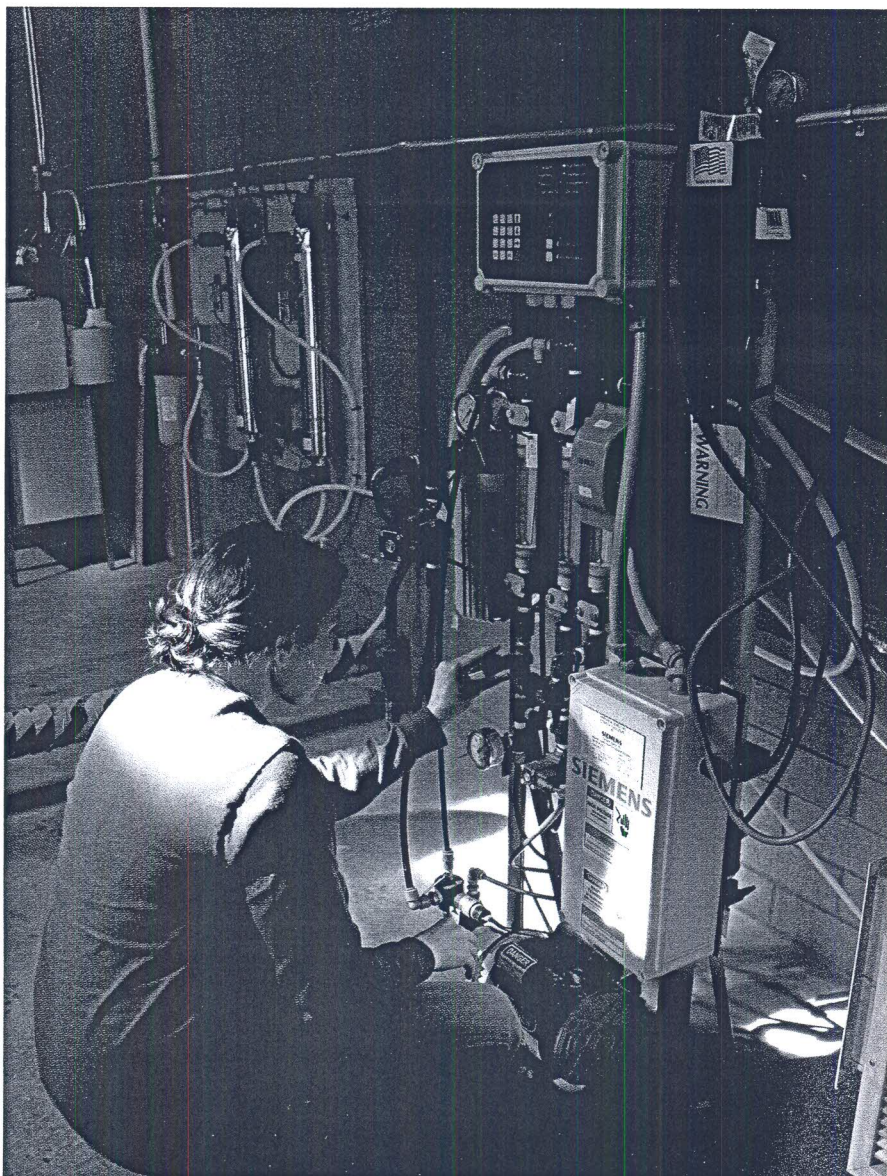
"It came out of curiosity, and I work with wastewater, and I wanted people to understand that wastewater plant effluent is actually pretty clean before it's discharged into lakes or rivers," Ratarasarn said. "I got

tired of explaining it."

So he decided to make an ale using effluent from the Jones Island Wastewater Treatment Plant in Milwaukee. The wastewater already had undergone primary and secondary treatment, and some



Wisconsin Department of Natural Resources wastewater engineer Theera Ratarasarn created an American wheat ale called Activated Sludge. He used purified wastewater from the Milwaukee (Wis.) Metropolitan Sewage District as the beer's source water. Theera Ratarasarn



Adrienne Menniti, a senior process technologist at Clean Water Services (Hillsboro, Ore.), operates the high-purity water system used to treat the effluent that brewers will use in their beers. The final effluent from the Clean Water Service's facility is of drinking water quality. Clean Water Services (Hillsboro, Ore.)



Last year, Clean Water Services arranged a professional tasting panel for the home brews created with effluent. The utility plans to do the same this year. Clean Water Services (Hillsboro, Ore.)

disinfection, but Ratarasarn said the effluent still wasn't clean enough to drink. He took additional treatment steps at home. He chlorinated and dechlorinated the effluent to disinfect it and then eliminate the chlorine. He also filtered the effluent using activated carbon and then distilled it. He called the final product purified water.

After that, Ratarasarn added nutrients back to the purified water. "The yeast needs nutrients to function properly," he said. So he used a software program to select the profile he needed for his beer. The "profile" is what makes each beer different, and that often varies according to the water that is used from different regions, he said.

Based on his desired profile, Ratarasarn added basic nutrients such as calcium carbonate, magnesium sulfate, non-iodized sodium chloride, calcium chloride, and calcium hydroxide. But it isn't an exact science.

"In the end, it's a lot of trial and error," Ratarasarn said. "If you add too much [nutrients], it can increase the alkalinity, for example."

After the experimentation and tinkering, he sent his homebrew to a lab for testing. The lab tested it for 130 contaminants, including metals, volatile organic compounds, pesticides, and bacteria. Results showed minute traces of silica and acetone, but the sample results were consistent with distilled water, Ratarasarn said.

Ratarasarn calls the final product

Activated Sludge. A professional tasting panel sampled the wheat ale thanks to the *Milwaukee Journal Sentinel*, which sought out expert opinions on the brew.

"One taste tester though it was good or better than some brews on the market," Ratarasarn said.

Changing the message

In Oregon, Clean Water Services is leaving the brewing to the experts. Instead of making its own brew, the utility will offer effluent for use in homebrews throughout Oregon once the utility's new project gets final regulatory approval. Mark Jockers, government and public affairs manager at Clean Water Services, said the proposal went before the Oregon Department of Environmental Quality, which held a public

comment period during February.

"Most of the comments were positive from what we saw at the hearing," Jockers said.

It will now go before the Oregon Environmental Quality Commission. The utility expects final approval by this month.

"We're proposing to use 100% effluent this year," Jockers said. Last year, when the utility did a similar project, it offered only 30% effluent, he said.

Last year using 100% effluent was "viewed as direct potable reuse by our regulators and required specific approval." So "what we did instead was draw water from the Tualatin River, directly downstream of our outfall where our effluent constitutes 30% of the flow," he said.

Once the effluent returns to the river it is no longer regulated as reuse, "but rather considered waters of state and required a relatively simple temporary water right permit."

Jockers said that with the Pure Beer Project, the utility is leveraging the love of craft brewing in the Pacific Northwest and the growing interest in water reuse thanks to chronic and sustained droughts in Texas, California, and Western Australia. The combination promotes Clean Water Services' water reuse efforts and gets brewers interested.

"The Oregon Brew Crew is one of the oldest and largest brewing associations in the U.S.," Jockers said. "They have a real affinity for water and water quality. They are always looking toward a sustainability piece to their brewing, whether it be reusing hops or installing solar panels."

He said the homebrewers also like that the distilled effluent is blank water. The effluent has undergone not only secondary



While the home brews were being judged last year, Clean Water Services displayed water samples taken from local sources to show the similarities and differences. Clean Water Services (Hillsboro, Ore.)

treatment but also ultrafiltration, reverse osmosis, and disinfection and advanced oxidation.

“They can take this blank water and add whatever they want to get the taste they’re seeking,” he said. For example, some brewers might want the Burton-on-Trent

profile that you often find in the United Kingdom. The blank water enables them to create those profiles, he said.

Last year 13 brewers produced 16 beers and provided the profile for each brew. This year, Jockers said they have enough capacity to provide water for 20 types of beer.

After a local judging event, Clean Water Services plans to send the six best brews to WEFTEC® 2015 in Chicago for a tasting event.

– ***LaShell Stratton-Childers, WE&T***