

# Algae may be key to cleaner Blackstone River



Clearas Water Recovery engineer Will Holm explains the algae wastewater treatment process Thursday. (T&G Staff/SUSAN SPENCER)

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MILLBURY — There could be a green answer to the region's largest wastewater treatment plant's challenge to meet strict federal water quality standards.

Algae, the slimy green growth that clogs waterways, are being tested at the Upper Blackstone Water Pollution Abatement District as a natural way of removing phosphorus and nitrogen, the very nutrients that, when they flow into rivers, ponds and bays, cause algae blooms and create low-oxygen aquatic "dead zones."

And algae treatment could also save green — money — in the long run when compared with conventional technology or more chemicals.

A pilot study of the Clearas Advanced Biological Nutrient Recovery system was showcased at the Upper Blackstone facility Thursday to about 50 wastewater engineers, public officials and environmentalists. The process, developed by Clearas Water Recovery of Missoula, Mont., uses specially treated algae in a controlled environment to remove excess nutrients and other

contaminants from sewage.

Philip D. Guerin, Worcester's director of environmental systems and an Upper Blackstone board member, said, "It's interesting and I find it amazingly simple at the same time. We're trying to learn what it can do."

Money from various sources paid for a pilot study at the Upper Blackstone plant of the Clearas system. The goal was to find a cheaper way to decontaminate wastewater at the plant, which processes typically 30 million gallons a day. Previous cost estimates of improvements using conventional technology to meet new federal limits have been as high as \$200 million, or more than \$200 per household.

An administrative consent order between the Upper Blackstone district, which treats wastewater for Worcester and six nearby communities, and the U.S. Environmental Protection Agency went into effect May 1, according to a statement last week from the district.

The consent order follows an unsuccessful legal battle waged by the district over stringent limits in the plant's 2008 National Pollutant Discharge Elimination System permit. The battle went through appeals at the federal level, and mediation.

Under the consent order, the Upper Blackstone plant must comply by Oct. 31, 2019, with the 2008 permit limits on discharging nutrients such as phosphorus and nitrogen into the river. The order also calls for the district to study and recommend ways of meeting the permit limits even during wet weather, when the plant handles a larger volume of incoming flow.

The Upper Blackstone's 2008 permit, which went into effect in October 2012, limits phosphorus discharge to an average 0.1 milligrams per liter over the summer and limits nitrogen to an average 5 milligrams per liter. The limits are among the strictest in the country, said Karla H. Sangrey, the district's director.

Upgrades to the facility in 2009 have led to performance that in 2013 was very close to meeting the new limits, but not consistently enough.

The Upper Blackstone's pilot study of the Clearas Advanced Biological Nutrient Recovery system started June 2 and runs for three more weeks before its performance will be analyzed.

"It's outside of the consent order tasks, but we're doing this in parallel," Ms. Sangrey said at the technology showcase. "This is very, very early stages of this technology. We're faced with this problem and we're trying to be creative."

She told the plant visitors: "We're exploring conventional solutions and a lot of those are extremely expensive, and we're kind of at the limit of where that technology can take us."

While many people think of algae as a potential biofuel, Ms. Sangrey explained that about a year ago, the district received a proposal from Clearas Water Recovery about sustainable ways algae could be used to treat wastewater.

Pro bono investment from CDM Smith and a grant from the Cape Cod-based Lyndon Paul Lorusso Charitable Foundation, which is searching for solutions to that region's wastewater problems, allowed the Upper Blackstone district to test it out.

Clearas CEO Jordan Lind told the audience the project was on the verge of "re-inventing or re-imagining the future of wastewater treatment."

Visitors toured the pilot facility at the treatment plant, where effluent goes through a three-stage Clearas process just before it is disinfected in the chlorine tank.

In the first stage, the wastewater is mixed with carbon dioxide and a blend of algae and other organisms.

The blended mixture then flows through a mile of 2-inch diameter pipes, looped in six rows in a small lighted greenhouse, which stimulates the algae's consumption of phosphorus, nitrogen and carbon dioxide, while producing clean water and oxygen.

In the third stage, microfiltration separates the mixture into a clean water stream and a stream to be recycled, with healthy algae and organisms to re-start the blending process for new wastewater.

Clearas engineer Will Holm said the company was also looking at ways to capture the carbon dioxide released from the district's incinerator to pump into the first-stage algae blending process, which would reduce the facility's greenhouse gas emissions.

"This is pretty cool," said Peter Coffin, coordinator of the Blackstone River Coalition. "It's still an experiment, on a small scale, but my sense is this polishes it off."

CDM Smith Senior Vice President Jane E. Madden said, "I guess we're hoping it might be a game changer."