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CLEAN SOLUTION

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Area firm has new system for removing dye from water supply

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It was a trio of wolves in full howl at a ghostly moon that put Keene-based T-shirt company The Mountain on the map in 2009.

But it's a more earthly matter that's getting the company attention these days.

At the beginning of this month, The Mountain flipped the switch on a new system at its Marlborough manufacturing facility that removes colored dye from its waste without adding chemicals.

The new system, which breaks the dye down, solved a longstanding problem that had threatened the future of the facility.

Such a system is "revolutionary" in the textile world, said Jeffrey D. Grosner, a partner at The Mountain and vice president of operations.

"We were looking at really changing our business model based on this problem we had," Grosner said.

The problem was this: The dyes that give The Mountain's shirts their bold hues were occasionally showing up at Keene's wastewater treatment plant.

The company had been using a chemical cocktail (sodium hydroxide, sodium borohydride, sodium metabisulfite and acetic acid) to hide the dye in its wastewater. The water was clear when it left the facility, but somewhere on the way to the treatment plant, as it mixed with other sewer water, the chemicals were losing their effect and the dye was returning.

"It would usually have either a darker or bluish hue when it when we would see it," said Eric E. Swope, industrial pretreatment coordinator at the Keene wastewater treatment plant.

Processed water from the plant goes into the Ashuelot River. "What you could see is that the water entering was darker than the water there," he said.

While chemically harmless, Swope said, the color change was enough to concern Keene officials.

In 2009, The Mountain saw its Three Wolf Moon shirt go viral, thanks to a tongue-in-cheek customer review on the online retailer Amazon ("Fits my girthy frame, has wolves on it, attracts women") and a goofy YouTube video.

State officials named it the official T-shirt of New Hampshire economic development. The Marlborough facility, which had been producing a total of 30,000-40,000 T-shirts a week, is now churning out 100,000 a week.

But the success exacerbated the existing water problem.

"We had more business, but it was a double-edge sword — our dye removal was inadequate and it showed the weakness," Grosner said.

It was bad enough to prompt city officials to issue an administrative order requiring The Mountain to deal with the problem. The company faced some grim options — contract out some or all of the dye business or even move the whole operation out of Marlborough. (In a bigger city processing a larger total amount of wastewater, the dye would be diluted more, Swope said.)

So Grosner set out to find a solution that would keep the water clear and the Marlborough facility intact.

The Mountain brought in a consultant from North Carolina who toured the facility and came up with two solutions: continue with the current chemical treatment method that hid the dye, an option in which Grosner had already lost faith, or develop a system that would add oxygen — called, therefore, an "oxidizing system" — to the water to break the dye molecule into its chemical components so it could not reappear. In The Mountain's case it would be ozone that broke it up.

Problem solved? Not so fast.

"I asked him, 'Can I go to a facility that is using this?' … The answer really was 'no,' " Grosner said.

While oxidation has been used for decades as a means of treating water, including drinking and wastewater, it is new to the textile industry. Grosner heard of some companies in Europe using it, maybe one down in Honduras, but was never able to nail down details. He scoured the Internet (and got good use out of Google Translate). He was ready to jump on a plane, but to go where?

Through a supplier, Grosner was introduced to Kevin T. Clute of O3 Solutions in Fort Wayne, Ind., which designs and engineers oxidizing systems. Clute came to Marlborough in April to set up a test system. The results were encouraging, and the company signed up for the full-scale system in September. It went online Jan. 3.

With the new system, water moves through two 9,000-gallon tanks and is twice injected with ozone. Chemically, ozone has three oxygen atoms (compared to oxygen, which has two) and is the most powerful oxidizer commercially available.

Three weeks in, the system seems to be doing its job. Swope said no traces of The Mountain's dye have turned up at the city's treatment plant and officials are happy with the company's solution.

High levels of ozone in the air can be dangerous. But Clute said The Mountain's facility has meters to test the air and will shut down if levels get too high.

This is the first system O3 designed for a textile company to remove dye, Clute said. While there are some textile facilities abroad that use oxidation, he knows of few, if any, in the U.S. that do.

One reason for that may be the high upfront cost. Grosner estimates the new system cost $500,000, but the company has seen immediate savings — the old chemical cocktail cost about $500 a day. The company is using more electricity to power the new system, which slightly offsets these savings.

Grosner's plans for the new system don't stop there. The oxidation process heats the water, and the company is now looking at ways to capture that heat to help heat water used in the dyeing process.

That requires water temperatures around 150 degrees.

"It's a stepping stone toward reusing and recycling our water," he said.

But for now, the system has already saved plenty, Grosner said. Without it, he guesses the facility's operations would be down significantly while the company looked to possibly relocate to a bigger city where dye in the water would be diluted more.

"It just wouldn't be good. Bad. Don't want to think about that."

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