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Water Filtration System in West Virginia Among the Elite.

MORGANTOWN, W.Va. — A raft of garbage covers a swath of the Monongahela River in northern West Virginia, a dozen miles upstream from the drinking water intake for 100,000 people.

Old tires, damaged toys, algae, oil drums, sticks and other refuse have crowded against the dam for so long that weeds sprout from them. Stuck against the spillway, the trash spans a football field's length from one bank to the other and spreads almost 30 yards upstream.

But the filth is no match for the Robert B. Creel Water Treatment Facility in Morgantown. The publicly owned plant routinely turns the dirty water into drinking water that far exceeds federal and state health standards, an approach that sets it apart from most systems in the U.S., according to the American Water Works Association. In addition to being safe, it won the association's award for best-tasting West Virginia water in 2016.

It's not cheap. The raw water from the Monongahela is treated in a system that was upgraded four years ago with a \$40 million municipal bond. The project increased production capacity in Morgantown, the home of West Virginia University and one of the few areas in the state that's been growing and water demand is projected to keep rising.

About 150 miles away is Charleston, where in 2014 a leaking chemical tank left about 300,000 people without water for roughly nine days. Even if a spill like that happened near Morgantown, its elite system wouldn't have been able to filter out the chemical that spilled into the Elk River and fouled Charleston's drinking water. But it does have sensors upstream that may have detected that something was amiss when the chemical leak started and could've closed its intake earlier, perhaps preventing people from losing their drinking water for days.

"From a health standpoint, Morgantown is going to be way better off than most utilities," said Rob Renner, of the Water Research Foundation in Denver. "These membranes take more of the risk out."

Renner is talking about membranes with microscopic openings that block most pathogens at the Morgantown facility.

That doesn't mean the water elsewhere is unsafe to drink. It just has less assurance that it's been properly filtered, so the risk that it contains contaminants is higher. Private utilities are reluctant to upgrade their systems the same way because of cost and regulations don't require it. Morgantown was different because it's publicly owned, and when its system needed to upgrade, engineers thought about safety and then the bottom line.

"I wish that would take hold in other places," said Angie Rosser, of the West Virginia Rivers Coalition. "They're showing their customers they are going above and beyond and instilling that confidence that we haven't regained in Charleston."

The disaster in Charleston spurred many utilities into action as they realized they couldn't take clean drinking water for granted. West Virginia American Water in Charleston said it continued upgrading

its source water monitoring and analysis last year and will add storage tanks and replace water mains in \$29 million of system upgrades this year. It uses gravel, sand and charcoal filters.

The Morgantown board in December 2015 was the first system in West Virginia to publish its source water protection plan, required by state law after the Charleston spill, listing more than 16,000 potential sources of significant contaminants, including nearly 12,000 above ground storage tanks, about 2,000 abandoned mine lands and about 1,200 Marcellus Shale natural gas wells.

Under the Safe Drinking Water Act and 19 major regulations since the 1970s, drinking water systems have spent about \$5 billion on upgrades to comply, Renner said. If every surface water treatment plant in the U.S. were to add membrane filtration like the one Morgantown has, it would probably cost billions of dollars, he said.

West Virginia's Bureau of Public Health requires all the water systems for more than 1.5 million customers to test for many contaminants. The bureau issued almost 5,000 violation letters last year, though none to Morgantown. The bureau also sent out 26 permit suspension warning letters, with 11 permits temporarily suspended.

Patrick Murphy, environmental engineering director for the state, said 33 administrative orders setting timelines for fixing multiple violations were issued last year, representing 3 percent of the systems. "Generally the systems in West Virginia are doing well," he said.

But the challenges from pollution are significant.

The Monongahela, which empties into the Ohio River at Pittsburgh, is on the West Virginia Department of Environmental Protection's list of "impaired" waterways. Garbage is a minor culprit. The leading polluter is fecal coliform, mostly from human waste. Next is iron, often from mining. Most lakes and many smaller streams lack enough data to tell if they're impaired.

Engineers at the Morgantown treatment plant face mine drainage, bacteria, sewage, fertilizer, chemicals and other waste and pollution in the Monongahela.

After the waste enters quarter-inch intake screens tilted slightly downstream, the river water is pumped into sediment settling tanks, then through six levels of gravel and sand filters and then through the membranes. Chlorine, lime, carbon, alum and potassium permanganate are added to help purify the water, but closely monitored to try to limit the minute chemical byproducts of disinfection, some considered carcinogens.

Control room operators constantly monitor 2,000 data points by computers with alarms if they exceed normal parameters, treatment and production manager Greg Shellito said. They sample water throughout the system, and in his 30 years, have never had to issue a boil notice, he said.

"In this industry you have to be 100 percent correct 100 percent of the time," plant manager Mike Anderson said. "What you do in this business is public health."

By THE ASSOCIATED PRESS

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