

Smart Solution to Water Pollution

Filtration material absorbs contaminants.

By J. I. Shane

Protecting our water resources is an issue that has moved from the environmental backburner to the forefront in global importance. Industries, individuals, communities, and countries are striving to advance water treatment technology. One treatment technology, which has recently been receiving much attention in the United States, is the Smart Sponge[®], a polymer-based filtration material resembling popcorn, which absorbs hydrocarbons and other contaminants within its porous structure and has the capacity to destroy bacteria.

The Smart Sponge addresses a variety of water quality issues. The technology is widely used in catch basin filters to treat polluted stormwater runoff; in stormwater outfalls to destroy bacteria near beaches and recreation areas; in vault applications to capture contaminants found in industry or construction wastewater; in airports to clean up oil spills and to reduce hydrocarbons from

entering nearby water supplies; and in numerous other water treatment applications.

Dr. Rodolfo Manzone, executive vice president and chief technology officer, AbTech Industries (www.abtechindustries.com), invented the Smart Sponge, and in recent years, advanced the technology to include an antimicrobial capability called the Smart Sponge Plus, which has proven effective to destroy bacteria, such as *Enterococcus*, *E. coli*, and fecal coliforms. Unlike other antimicrobials that poison harmful microorganisms, the Smart Sponge Plus ruptures the bacteria cells' membranes, preventing them from functioning or reproducing.

In describing the technology, Manzone said, "The Smart Sponge is a relatively simple system based on synthetic polymers. Its unique molecular structure is chemically selective to hydrocarbons and also has the capacity to destroy bacteria. The antimicrobial agent is permanently bound to the Smart Sponge polymer surface, so that it doesn't leak, avoiding any toxicity issues downstream."

Manzone explained that one of the advantages of the sponge over traditional sorbents is its ability to fully encapsulate recovered oil and grease. "The Smart Sponge absorbs, rather

than adsorbs, hydrocarbons. This ensures that they will not leach back into the environment even under high pressure. Also, when absorption filtration material is saturated, it is suitable for recycling or disposal."

Smart Sponge samples saturated with hydrocarbons both in the lab and the field have been tested according to the EPA's Toxicity Characteristic Leaching Procedure. These tests show that Smart Sponge is a "non-leaching" product. As a result, Manzone explained, there are many cost-effective options for disposal. A segment of the solid waste industry has used spent Smart Sponge as an alternative fuel to produce electricity. This form of disposal is acknowledged at the federal level as a renewable energy source under the Federal Power Act, Title IV of the Clean Air Act. In addition the cement kilns industry has used spent Smart Sponge as an alternative fuel in the production of Portland Cement; this process is considered a beneficial reuse of waste products. Spent Smart Sponge products have been classified as a solid waste and have been accepted at Subtitle D landfills.

Glenn Rink, the company's founder and CEO, said that in 1997 one of the first uses of the sponge was to clean up oil spills from tankers in the ocean. A few years later, when federal regulation focused on reducing pollutants from stormwater runoff, Rink quickly realized that the malleable sponge could be easily adapted to water treatment solutions for municipalities' stormwater management programs.

"We found our Smart Sponge filtration material could be molded into different shapes that would fit into street-level storm drains and catch basins. We



Long Beach and Norwalk fitted critical storm drains, such as this one, with high-technology filtration systems filled with Smart Sponge Plus, which contained the antimicrobial capability to protect recreational beaches.

adapted its use to fit the specific needs of communities that were aiming to reduce contaminants in urban and stormwater runoff, which eventually ends up in local waterways,” Rink said.

Applications

Long Beach, CA. In 2004, Long Beach, located on the California coastline, installed 2,000 AbTech filters, choosing the Smart Sponge Plus with its antimicrobial capability to protect its recreational beaches from bacterial pollution—one of the most frequent causes of beach closures. Tom Leary, stormwater management program officer with the Long Beach Public Works Department, said that following the sponges’ installation, in a year of heavy rainfall, the system helped prevent 92,000 pounds of trash and debris and 3,600 gallons of waste oil from entering the ocean.

Scarborough Beach, RI. Another custom application of sponge technology was successful in Rhode Island. Scarborough Beach, a popular salt-water recreation area, which attracts over a half million people in the summer season, had suffered closures due to high bacterial levels.

Cindy Baumann, director of engineering for Crossman Engineering, was the chief project consultant on the Scarborough Beach stormwater management project. Her solution involved diverting the flow of runoff to a system of new drainage piping filled with Smart Sponge Plus.

The project included monitoring and testing water samples to determine the Smart Sponge Plus’ effectiveness for reducing and removing bacteria within stormwater runoff. In both dry and wet weather sampling, the maximum removal rates for fecal coliform ranged from 89.4 to 99.6 percent. In the same sampling process for *Enterococcus*, the removal rates ranged from 96.2 to 99.9 percent.

Norwalk, CT. Norwalk also has benefited from using Smart Sponge Plus in its stormwater management improvement projects. “Cleaning up polluted street runoff in stormwater before it flows into the Long Island Sound is our highest priority,” said Hal Alvord,

Director of Public Works in Norwalk. The city fitted 275 storm drains with high-technology filtration systems filled with Smart Sponge Plus. Tests revealed that the average removal rate was over 75 percent and the maximum removal rate was 99.9 percent. The first cleaning of the catch basins yielded over 7.4

tons of trash, debris, leaves, sediment, and sand. Without the filtration systems, all this would have gone into the Long Island Sound’s recreational waters.

Since these earlier projects in Long Beach, Scarborough Beach, and Norwalk, AbTech’s business with municipal customers has grown significantly, and today 70 percent of its business is with local governments. The company currently has 13,000 installations in 36 states and eight countries.

Westchester County Airport, NY.

Michael Parletta, Westchester County Airport’s Environmental Officer, said the county is using the sponge in catch basin inserts in critical storm drains to protect waterways surrounding the airport from polluted runoff.

“We have 54 Ultra-Urban Filters in place in critical storm drains—curbside, roadside, along taxiway areas, and on the open tarmac. When spills occur within these areas, we use the filters as a first line of defense. Each filter can handle five- to eight-gallon spills, which suits our needs because most spills at this facility are fewer than five gallons.



Westchester County (NY) Airport has installed catch basin filters in critical storm drains to protect waterways surrounding the airport from polluted runoff.

“We know that if we don’t get to a spill before it reaches the storm drain, the filters can handle them.”

According to Parletta, with the extreme weather events in New York, it’s essential that the county’s catch basin inserts are easy to install and maintain. “For the filters to do their job, we have to perform regular maintenance. During the pilot program and beyond, we have found the Ultra-Urban Filters easy to maintain.”



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