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Molasses used in cleanup of polluted sites

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For more than half a century, International Molasses Corp. has sold its product to bakeries and manufacturers that use the sticky syrup in cookies and candy.

But recently, the Saddle Brook company found a new and unexpected market — at contaminated industrial sites, where the molasses literally gets pumped into the soil.

It turns out that molasses can be used to clean up cancer-causing solvents.

A 6,000-gallon tanker truck filled with diluted molasses recently pulled into the parking lot of the 25-acre campus of Kearfott Guidance and Navigation Corp. in Woodland Park. Workers attached hoses from the truck to several injection wells, and the molasses flowed silently into the ground under the facility's parking lot to help rid groundwater of high levels of contamination that seeped into the soil decades ago.

In a relatively new process called enhanced anaerobic bioremediation, the diluted molasses provides a food source for microbes that occur naturally in the soil. The microbes multiply, then use the solvents the way humans use oxygen, breaking them down into non-toxic byproducts, such as carbon dioxide.

International Molasses now ships its syrup to cleanup sites in New Jersey and several other states.

"A few years ago we started seeing a lot of growth in this area," said Eric Lushing, vice president of Malt Products Corp. and its subsidiary, International Molasses Corp., which supplies molasses to the Kearfott site.

"The molasses we produce is food grade, which is not true of a lot of refineries, which make it below food grade," Lushing said. That makes their product more appealing to cleanup experts, since food grade molasses does not contain other chemicals that might exacerbate a contaminated site's issues, he said.

The companies' molasses and malt products are more typically sold to food manufacturers that make cookies, snack foods, breakfast cereals, candy and peanut butter.

International Molasses Corp. began in 1957 as a regional supplier of malts and has grown internationally. It has manufacturing plants in Maywood as well as in Canada, Great Britain and the Netherlands. The company also has a product called Eco-Molasses, a byproduct of sugar refining that is sold to golf courses and other facilities for lawn maintenance. Eco-Molasses is touted as a product that improves leaf color and plant health, decreases thatch, and increases microbial activity in the soil.

'99 percent' clean

"We're hoping that within two years this process will bring the contaminants down to an acceptable standard," said Mo Mohiuddin, project manager with Arcadis, the contractor hired to clean up the Kearfott site. "We won't get every molecule of contamination but we should be able to hit 99 percent of the mess."



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Anaerobic bioremediation is a growing strategy for contamination cleanup experts. It has been used at hundreds of sites nationwide, including Air Force bases from Oklahoma to California.

Mohiuddin said Arcadis has used it successfully at dozens of sites, including a 3M plant in upstate New York and a Johnson & Johnson facility in New Jersey.

DuPont is conducting a pilot study to determine how well bioremediation would work to clean up groundwater contaminated with solvents beneath homes in **Pompton Lakes**. Instead of molasses to spur microbe activity, however, DuPont plans to inject the soil with soybean oil.

The concept is the same, but whether vegetable oil or molasses is used depends on factors specific to each site, said Dan Pope, a consultant affiliated with the federal Environmental Protection Agency.

"It's mainly dependent on the practical problems of making it work at the site. How long do you need or want the product to last in the subsurface — a few days, months or years?" Pope said. "Molasses is more readily broken down — it's pretty soluble, and you can push it out farther and more quickly into the subsurface. Oil globs on to the subsurface particles more. But in the end, basically they are both food for the microorganisms in the soil."

Arcadis' Mohiuddin agreed. "Oil stays a much longer time in the soil, and the remediation rate is slower," he said. "The molasses solution degrades very quickly." Molasses is also cheaper."

In the Kearfott cleanup, the molasses gets hauled in by tanker truck each month, Mohiuddin said. Workers attach hoses from the tanker individually to each injection well.

Because bioremediation is still relatively new, little data exist to measure success. Most sites using the process are still undergoing remediation and are not fully cleaned.

Sits close to rivers

The Kearfott plant on McBride Avenue is bordered by the **Passaic** and Peckman rivers. The facility was built in 1950, and the company makes navigation and guidance systems, gyroscopes and other electro-mechanical products for the aerospace industry.

Before the early 1960s, chemical waste at the site, including solvents, was disposed of in dry wells, most likely unlined holes dug about five feet deep, according to documents filed with the Department of Environmental Protection. Later, waste solvent return lines from degreasing tanks were fed into 55-gallon drums for disposal.

In the 1980s and early 1990s, several underground storage tanks that had been leaking were removed from the site. They had been used to store solvents, gasoline and fuel oil. Several hundred yards of contaminated soil was excavated and disposed offsite in 1993.

Testing of the soil and groundwater indicated extensive contamination by six volatile organic compounds, including the solvents PCE and TCE, which have been linked in lab studies to cancer. Most of the contamination was detected near the site of the underground tanks.

Worried the contaminated groundwater could flow into the bordering rivers, an earlier contractor proposed installing a slurry wall in the ground to block the contamination and a pump and treat system to strip the contaminants out of the groundwater.

But Arcadis said the molasses treatment would be faster.

A six-month pilot test in 2005 to inject the molasses near the rivers worked well enough for Arcadis to propose widening the scope of the injections to the rest of the site. But the DEP case manager for the site left, Mohiuddin said, and it took the state until 2009 to issue the permits to restart molasses injections.

Arcadis recently won approval to add 14 more injection wells, which were drilled a few months ago. Arcadis now pumps about 6,000 gallons of molasses each month into 24 wells extending 16 to 17 feet deep.


Cleanup costs between 1986 and 2010 totaled an estimated \$2.4 million, and cleanup through 2015 is expected to cost another \$1.3 million, DEP records indicate.


Groundwater will be monitored quarterly until there are significant declines in contamination, officials said.

"Once concentrations in groundwater are around regulatory levels, wells will be abandoned," Mohiuddin wrote to the DEP in an August 2010 letter.

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