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You're Grounded!

University of Dayton, Ohio (url: http://www.udayton.edu/index.php)

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05.17.2007 | Research, Science, Faculty Dig up contaminated soil, pour in water containing a material barely visible to the naked eye and heat mixture to 752 degrees. Put clean soil back into the ground and enjoy.

University of Dayton doctoral student Patanjali Varanasi and UD mechanical engineering professor Sukh Sidhu cooked up this recipe as a cheaper, pollutant-free substitute for ridding soil of a chemical harmful to people and animals.

"The idea is for the soil to be clean enough for kids to play in," Sidhu said.

The EPA estimates that polychlorinated biphenyls, or PCBs, still contaminate 525 million tons of soil. The U.S. Department of Health and Human Services says PCBs can cause acne, rashes and liver damage in people exposed to large amounts. Animals can suffer liver, stomach and thyroid gland injuries. PCBs are found in old fluorescent lighting fixtures, appliances made 30 or more years ago and food harvested from contaminated ground or water.

Varanasi and Sidhu found the use of iron nanoparticles, which are much smaller than a human hair, lowers the temperature at which crews can destroy PCBs without emitting additional toxins. Varanasi is a candidate for a doctoral degree in materials engineering.

Chemosphere, an international environmental science journal, published their findings.

"Without nanoparticles, you need much higher temperatures to clean the soil. But that sends dioxins and other pollutants into the air, and then they are difficult to capture and destroy. (Current methods) have higher costs and associated risks," Sidhu said. "(Because we can achieve clean soil at a lower temperature), we don't have to use as much energy. Less energy means less fuel consumption, less money and lower carbon dioxide emissions."

Varanasi and Sidhu are working with Environmental Chemical Corp. of Burlingame, Calif., to commercialize their "cocktail." The consulting firm helps clients concerned with the problems of human exposure to potentially hazardous substances in the environment.

Varanasi and Sidhu estimate that this technique will be ready for widespread use in two years.

"Learning techniques I could apply to solving the problem was most important," said Varanasi, who has studied water pollution in India, about her 18-month study. "It was really difficult but really interesting."

Ohio has nine active Superfund sites with PCB contamination in the soil, according to an online search of U.S. EPA records. Five are in the Miami Valley — Chem-Dyne (Butler County), Skinner Landfill (Butler), Feed Materials Production Center (Hamilton, Butler), Mound Plant (Montgomery) and Powell Road Landfill (Montgomery). Congress created the Superfund Program in 1980 to locate, investigate and clean badly polluted sites nationwide.

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