Magic Sand WINNERS

by Harvey Black

Remember Magic Sand? In an April 1994 *Chem Matters* article about this unusual water-repelling material, we announced a contest and asked readers to come up with new ways to use this product. Magic Sand, which was once a hot-selling toy, feels like regular beach sand. But unlike regular sand it is not wet by water.

The process of making Magic Sand begins with silica particles that are treated with the vapors of trimethylchlorosilane, $(CH_3)_3SiCl$. When ordinary beach sand is coated with the treated silica particles, the result is a new surface of nonpolar covalent bonds that are hydrophobic — they repel water. Ordinary beach sand is just the opposite. It's hydrophilic — attracts water — because its surface contains polar oxygen and hydrogen–oxygen bonds (see "Magic Sand," *Chem Matters*, April 1994).

The manufacturer, the Clifford W. Estes Company, is looking for new ways to use Magic Sand. And we wanted to see if our readers could come up with some innovative ideas. The rules of the contest were simple: Get some magic sand, think hard about its properties, and play with it until inspiration struck. The entries consisted of a description of the idea and, if an actual experiment was done, a full report. Solo entries or entries with one other student were allowed. Entries were judged on creative thinking; practicality of the proposal; proper experimental design and procedures; and a clear, well-organized presentation.

And the winners are…

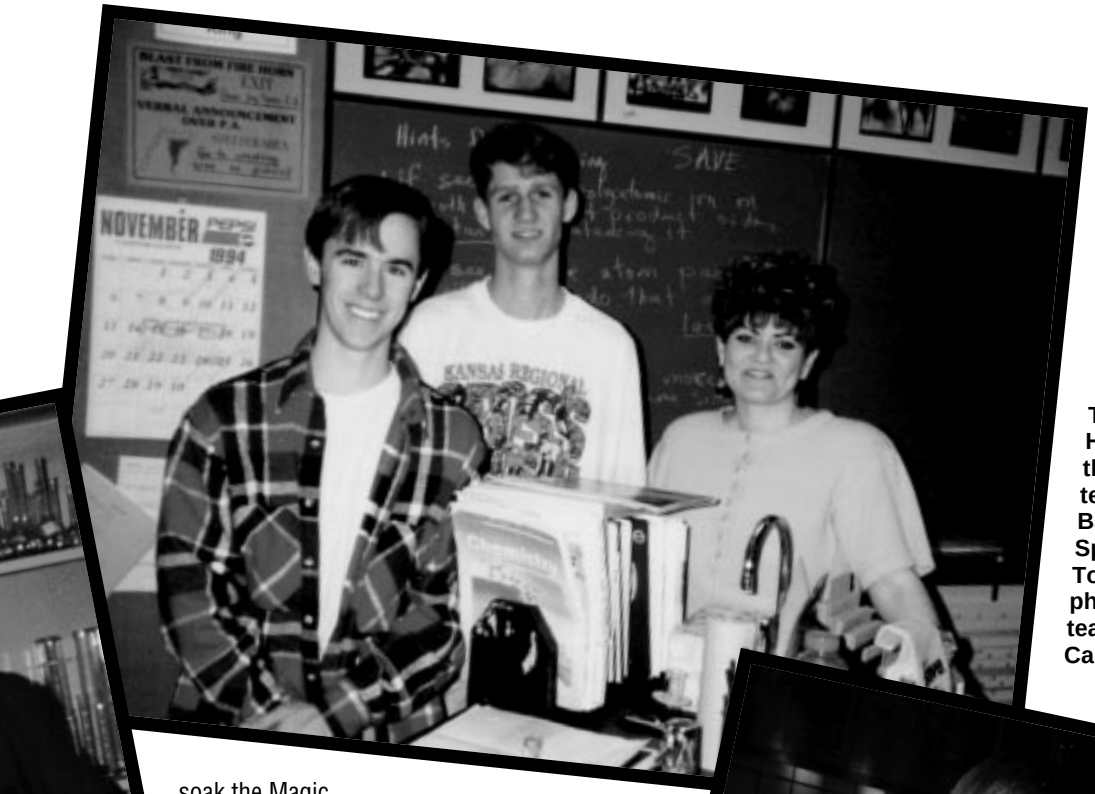
The five teams below are winners and soon will receive T-shirts, reading "I've got the Magic! Sand," and congratulatory certificates from the American Chemical Society. And the winners are:

Holly Barbaccia, Vineland High School, Vineland, NJ; teacher, Vicki Volpe. Holly suggested that because Magic Sand is not wet by water, it would be useful as a surface for horse racetracks. The tracks would not become muddy when it rained. She sprayed water on a layer of Magic Sand and observed that the water formed beads and ran off the layer. She reasoned the water could be vacuumed up, but said she couldn't test the idea.

Erik Sprague and **Jessica Mehlinger**, Vineland High School, Vineland, NJ; teacher, Vicki Volpe. Erik and Jessica explored the possibility of using Magic Sand in golf course sand traps. Unlike ordinary sand, it wouldn't clump together in wet weather and make it more difficult to hit the ball with just the right force. In their planned experiment, they would hit a golf ball with a sand wedge, and would "need a device to put a constant force on a golf club at a constant depth in the sand. Regular sand and Magic Sand, both wet and dry, would be tested.

The Magic Sand Contest was one of the first chances the students had to think about and investigate something on their own, said Vicki Volpe, who teaches Holly in an advanced placement chemistry course and Erik and Jessica in an honors chemistry class. Volpe says the contest was so successful and enjoyable she plans to have her own Magic Sand contest in the future.

Jeff Hall, Seaman High School, Topeka, KS; teacher, Theresa King. Jeff suggested using Magic Sand in children's sandboxes. The Magic Sand wouldn't form clumps after it got wet. He proposed testing the idea by lining the bottom of a sandbox with a mesh filter to let the water, but not the sand, escape. The water, which wouldn't



The contest winners from Vineland High School, New Jersey, are shown in the left photo. They are (left to right) teacher Vicki Volpe and students Holly Barbaccia, Jessica Mehlinger, and Eric Sprague. From Seaman High School in Topeka, Kansas, the winners (center photo) are Jeff Hall, Josh Sales, and their teacher Theresa King. In Paso Robles, California (right photo), the winners are teacher Chris Lynds and student Shaw Lynds.

soak the Magic Sand, would drain through the filter.

Josh Sales, Seaman High School, Topeka, KS; teacher, Theresa King. Magic Sand would be used to aid in the drainage of water from walls and foundations of homes built below ground or into hillsides. A 6-inch layer of sand would be placed next to the foundation. The sand would not let the water infiltrate the foundation, run into basements, and rot the wood. The proposal recognizes that such a large quantity of Magic Sand would be expensive, but reasons that if this use were widely adopted, the cost would decrease and become reasonable.

Teacher Theresa King says Jeff and Josh are "high-achieving, hard-working, creative students" in her honors chemistry class, and expects they will go on to pursue careers in science.

Shaw Lynds, Lynds School, Paso Robles, CA; teacher, Chris Lynds. A mixture of Magic Sand and normal sand would be used as a base under asphalt roads. This application would let rainwater drip into the ground through the asphalt, but would prevent oil from cars and asphalt from draining into the groundwater. Magic Sand would trap the oil. He tested the idea with three experiments. By trying various ratios of Magic Sand and regular sand, Lynds arrived at a suitable mixture (1:6). He next compared the speed with which water went through the 1:6 mixture and ordinary sand. Finally, by pouring varying ratios of oil and water into the 1:6 mix, he found how much oil would be captured and how much water would pass through, and determined how much Magic Sand would be needed to capture a cubic centimeter of oil.

This entry was just one of many ideas Shaw developed for Magic Sand, says his mother and teacher, Chris Lynds. Shaw, who is being "home schooled," also thought that Magic Sand could be used to waterproof fabrics. Chris describes Shaw as a tinkerer who enjoys investigating electronics.

Congratulations to all!

***Harvey Black** is a science writer in Madison, WI, and a frequent contributor to* Chem Matters *magazine. He wrote "Poison That Heals" in the December 1994 issue.*