

# Arsenic in Drinking Water:

## A Solution to an International Problem

BY JOY BAUM

**WHEN YOU DRINK A GLASS OF TAP WATER, DO YOU EVER THINK IT COULD BE SLOWLY POISONING YOU?**

**IN SOME PARTS OF THE WORLD, THIS IS TRUE.**

**CATHLEEN WEBB, HEAD OF THE DEPARTMENT OF CHEMISTRY AT WESTERN KENTUCKY UNIVERSITY, IS TRYING TO COME UP WITH A SOLUTION TO THAT PROBLEM.**

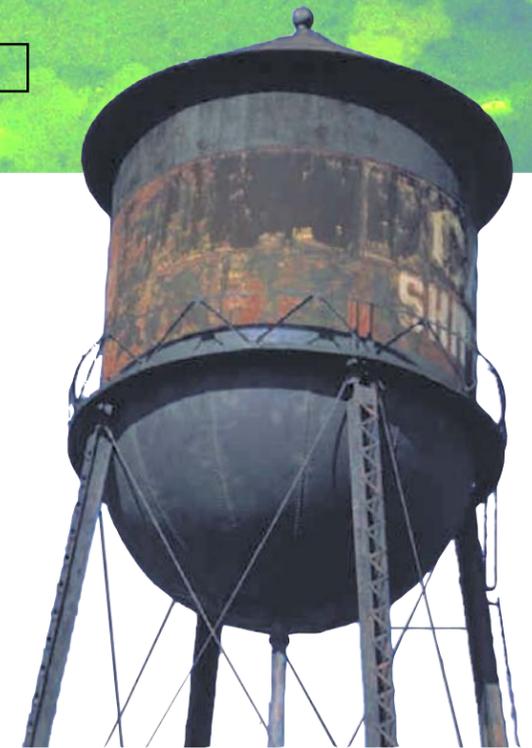
Dr. Webb is working on a project to lower arsenic levels in drinking water using a low-tech solution that all Kentuckians can appreciate. She is filtering the water through modified limestone. She has been working on this solution since 1999 when the Environmental Protection Agency (EPA) announced it was going to lower the amount of acceptable levels of arsenic in drinking water in the United States.

"When they announced that the arsenic was going to be lowered, it suddenly occurred to me there was going to be significant economic pressure on small rural communities," she said. "Communities of a few hundred people, or ranchers that might have one or two wells, lacked the resources to impose the sophisticated technology that is available for large water quality systems that have trained operators and engineers managing their water treatment facility."

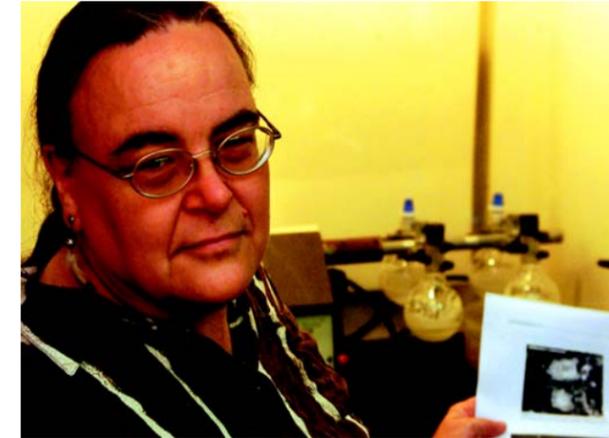
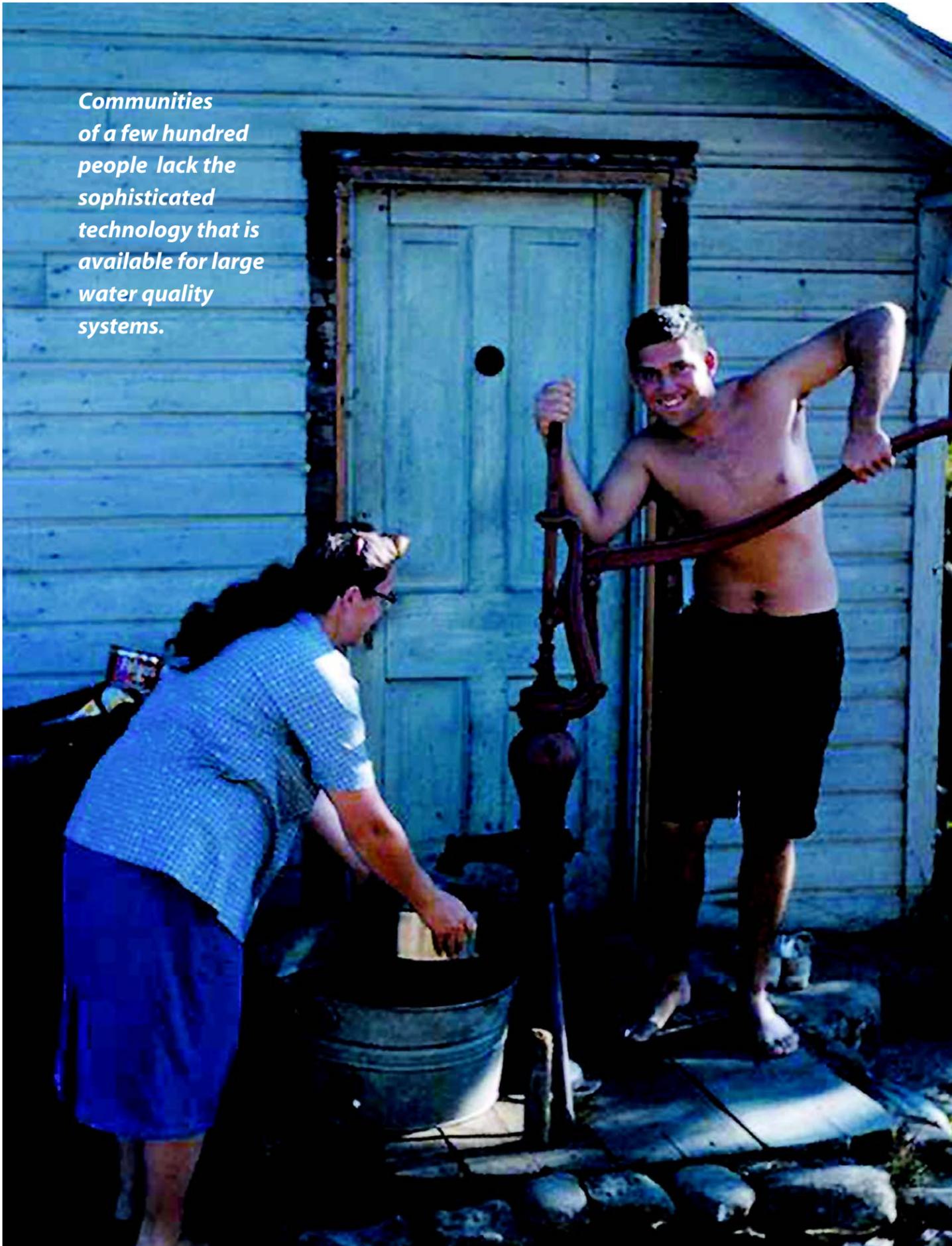
Dr. Webb discovered the inexpensive solution by accident while working on a watershed study in South Dakota. She noticed that levels of other metals were the

same after water passed through a limestone basin, but levels of arsenic were lower. "That was actually only a minor piece in a very large project then," she said.

But now, her acute observations have started to pay off. She began her work at the South Dakota School of Mines and Technology, and brought the project with her when she came to Western in 2001. She still collaborates with an engineering team (Drs. Arden Davis and David Dixon) from the South Dakota School about once a month, where she is still formally on a graduate committee.



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*Dr. Cathleen Webb*

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*Gretchen Berryman examines sample of limestone that will aid in the detection of arsenic in water.*

When the limestone idea was first proposed, there were a number of program directors who were a little skeptical, but the research has convinced them. "We never make claims that we can achieve the level of efficiency of the much more expensive materials," she said. "We never try to fool them into thinking this is a perfect solution. But we do have a niche, and we can solve one of their problems. It seems so straightforward. We could make it more efficient but then we would go into expensive modifications, and we don't want to do that. The point is to keep it simple and inexpensive." She is currently working on a patent for her project.

Small communities in the United States may not be the only ones affected by her research. Poor countries like Taiwan, China, and India may be able to use her limestone solution to filter their water as well.

"I think this a really great project," she said. "I've never worked on a project that could have the potential for such a global impact. This is a chance to vastly improve quality of life for many people."

The Bluegrass state may benefit from the project as well, if limestone for the project is mined from Kentucky. "Since limestone is the base for my material, and limestone is an important mineral in Kentucky, this is an obvious new market for an important native resource. There are economic benefits. This is why the Kentucky Science and Engineering Foundation has, in part, funded the project." The Kentucky Science Engineering Foundation gave her a \$59,942 grant in May 2003.

Funding also comes from the Environmental Protection Agency, Kentucky Water Resources Institute, the United States Geological Society, and the National Park Service.

She is working with two undergraduate students, Gretchen Berryman and Chelsea Campbell. Both students agree that they really enjoy working on this project and working with Dr. Webb, who sees this as a chance for students to participate in applied research for environmental problems. "It gets them out of the classroom and into the real world," she said.

Even in her introductory classes she tries to give her students hands on experience. One project they do in Chemistry 475 is to bring in paint samples from their homes to test for lead. Dr. Webb said students are usually surprised at the results they get. "I had one student bring in her child's blocks that were painted. We were shocked at the lead levels in the toys."

Dr. Webb has her doctorate in chemistry with an emphasis on physical chemistry. Her specialty is environmental geochemistry, specifically with the fate and transport of heavy metals in ground water. Her passion for this came from growing up in a small mining town, Butte, Montana.

"I grew up playing in large piles of mine tailings as a child, and back then, nobody really thought anything about it," she said.