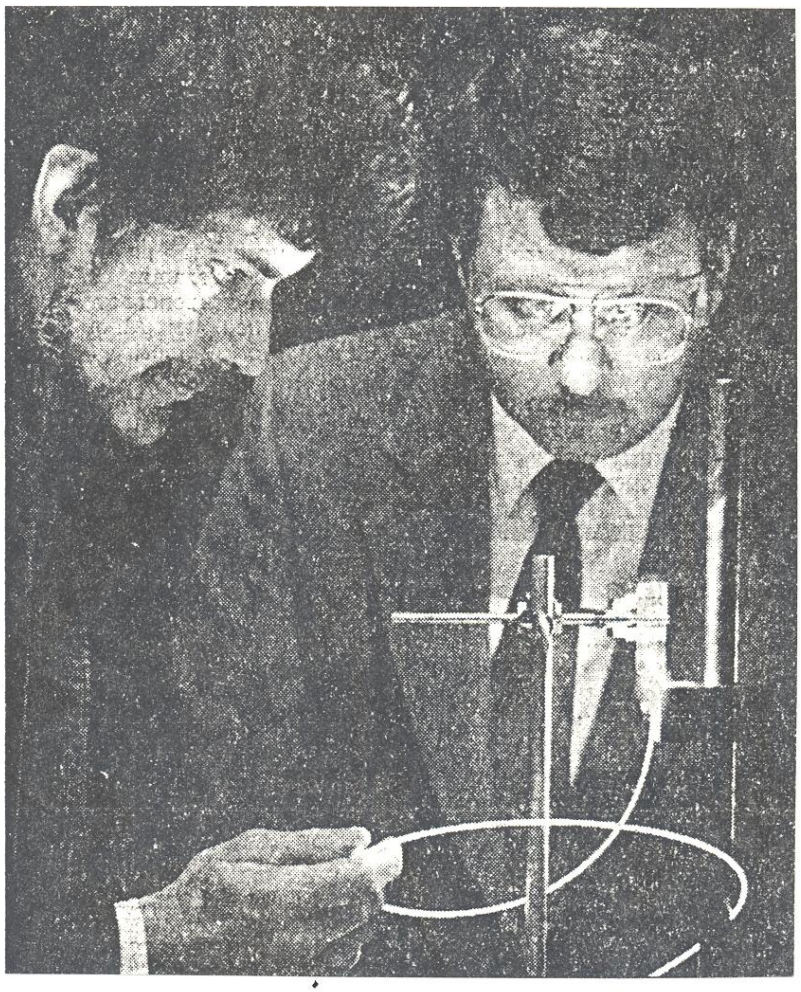
The Huntsville Times

Huntsville, Alabama, Thursday, March 12, 1987



(Times Photo by Glenn Baeske)

JOHN GILBERT, JAMES SMITH OF UAH
'Right in the Forefront of Development'

Fiber Optics Used To Monitor Waste

By JOHN PECK
Times Staff Writer

Fiber optic "roots" may soon be used to monitor the spread of hazardous chemicals from industrial sites and landfills into groundwater.

Two University of Alabama in Huntsville professors are awaiting word on whether the U.S. Department of the Interior will help fund the $350,000 study.

Dr. John Gilbert, director of civil engineering, and Dr. James Smith Jr., director of chemical engineering, are conducting preliminary studies on use of fiber optic sensing mechanisms in the detection of groundwater contamination.

Research assistants Steven Gardner and Kathleen Leonard also are working on the project.

"This is right in the forefront of development," Gilbert said this week. "Fiber optic sensors, whether it be chemical sensors or mechanical sensors for measuring vibrations or deformations or whatever, are the type of things that are currently under development."

Researchers say the process would require permanently placing fiber optic strands in areas that warrant careful groundwater monitoring such as landfills, toxic waste dumps, chemical plants, service stations, certain industries and other sites.

SENSORS ON the bottom of the optic fibers would be linked at the upper end to a computer and spectrometer.

As light is shot through the optic fibers, its characteristics are changed on the return if the sensors have encountered certain contaminants. The return signal is collected and transmitted to a spectrometer via a fiber link where it is spectrally sorted.

By reading the peaks and wavelengths, the nature and concentration of contaminants can be determined, as well as the flow rate and direction.

Researchers say the fibers could be developed to react to certain chemicals if they are the only contaminants suspected in polluting the groundwater. The fibers could be used to check the spread of industrial chemicals, agricultural runoff and chemical spills from landfills, storage ponds and leaking underground storage tanks.

"THE WAY it's done now, it's when the chemical appears that people are told to stop" using the water, Smith said. "The conventional method requires someone to go to the well and collect a sample, and go back to a laboratory and test it. The analysis generally takes place in conditions not exactly like that in the well so it is possible (the sample) could volatilize."

Using fiber optic sensors, testing could be done more frequently and instantaneously, eliminate on-site physical sampling, and provide more accurate analysis of the chemicals involved.

"At the same time we're providing the feasibility of monitoring through the fiber optic systems, we're also getting a better feeling as to what actually happens to soil groundwater interactions," Gilbert said. "That's not very well known right now because when they drive those wells, a lot of stuff from the top and bottom mix and you get vertical mixing."

Smith said fiber optic measuring has other spinoffs, adding, "It could also be used to prove someone was not contaminating."

Gilbert pointed out its possible use in chemical plants for quality control.

"If there were some kind of toxic chemical at a plant and they wanted to test it to see that they are producing what they want," he said, "rather than send a guy out there to take a scoop of the stuff and bring it back to the laboratory, this could give them an alternative method."