

Robotic Groundwater Monitoring

By Danny Lewis, Editor

A new robotic system for automated groundwater monitoring could result in better and less costly monitoring and faster warnings when problems occur, said one of the system's inventors.

The "Robowell" system was developed by Greg Granato, a hydrologist and Kirk Smith, a hydrologic technician, with the US Geological Survey (USGS) at their office in Northborough, MA. "Robowell" monitoring results can be transmitted instantly from a well site to a supervisor via radio, cell

The robotic system measures well quality using the same techniques a human sampling crew would use, but it can monitor a well or cluster of wells much more often than would be possible for human samplers.

"A person should still go out and monitor every once in a while, but you get better quality data with our technology," Granato said. "It's never too hot or too cold for it to take samples and it's actually set up so it will call someone with a voice modem if contamination occurs or if you have an

allowing a technician to sample many more wells in a day than would be possible otherwise.

The "Robowell" system at the test sites utilized a pressure transducer to monitor and record the water level and record the water level and an-line flow sensor to monitor the rate of ground water pumped through the system. A multiprobe with a flow cell was used as to monitor water temperature, pH, specific conductance, dissolved oxygen and dissolved ammonium. A data logger controlled the process and stored data in a solid-state storage device.

Granato said the system can be set to use any currently available monitoring probes and it can perform monitoring duties on a daily, weekly, or monthly basis. such sampling frequency could help detect problems quickly and efficiently, Granato emphasized.

"A lot of groundwater sampling people assume that once a month or four times a year is enough, but until you sample you never know if there's a problem," he said. "The sooner you find out about a problem, the less area gets contaminated. One idea would be to have this at the edge of the capture zone for a well field so you could tell if you are getting contaminated water."

Granato said the "Robowell" system could also improve environmental monitoring programs at landfills or at sites where hazardous substances could pose environmental threats if leaks occur.

"The device could also be set to monitor sites such as gas stations to detect leaks immediately rather than after large amounts of contamination have occurred. If you don't find out about a leak for three months, there's

a lot more problems and a lot more remediation and costs you have to deal with," he said.

Although the new "Robowell" system is not yet on the market, Granato said the system recently was awarded a patent and some companies have expressed interest in marketing it.

"We hope to make a technology transfer so the private and public sectors can soon benefit from it," he said ■

The sooner you find out about a problem, the less area gets contaminated

phone modem, or satellite link for immediate access to the data. The device is programmed to let the supervisor know when monitored conditions have changed sufficiently to indicate the water quality has changed.

"This system does exactly what it's supposed to do every time and you have a documented electronic record that it did what it was supposed to do," said Granato.

Preliminary testing of the new electronic system at a highway site, sewage infiltration facility, an experimental groundwater cleanup test site, and the septic system for Walden Pond State Park in Massachusetts yielded valuable data regarding movement of monitored constituents in groundwater at each site, Granato said.

equipment problem at the well."

Capabilities of the voice modem were demonstrated at the experimental contaminant cleanup site, where the modem informed the project chief an expected plume of contaminated water had arrived, so she could begin sampling the water manually. Testing at the sewage treatment site showed data collected by the "Robowell" system was equivalent to data collected manually at the site.

Granato said the "Robowell" system can even be set to prepare a well for sampling and download data it has collected at times when the well is scheduled for manual sampling. Using the system that way could result in cost savings and improved efficiency by

