

# Fact Sheet

## A DOPPLER VELOCIMETER FOR MONITORING GROUNDWATER FLOW

### PROBLEM

Measurements of groundwater flow velocity and direction can provide valuable information for many hydrological studies and environmental monitoring applications. These include predicting the rate and direction of propagation of hazardous or toxic waste plumes through the surrounding aquifer. Groundwater flow rates can be significantly less than a meter per day, making accurate measurement difficult with existing methods.

### HISTORY

Currently, the most common down-borehole groundwater flow measurement technique relies on radial thermal transport from a centralized heat probe to a concentric array of sensors. This technique, which relies on heat migration, tends to lose accuracy at very low flow rates because of dispersion and vertical propagation of the thermal energy.

### SOLUTION

A high-frequency, down-borehole, acoustic Doppler vector velocimeter (U.S. Patent # 5,796,679) has been developed that is capable of measuring both the velocity and flow direction of very slowly moving groundwater at very low flow rates. The system uses a down-borehole acoustic transducer array and microcomputer-controlled electronics to measure and display the velocity and direction of groundwater flow. This special hardware and software system permits accurate measurement of groundwater flow velocity at rates less than 10 cm per day in as little as two hours.

This invention has the following advantages:

- Measurement of groundwater flow rates of < 10 cm/day
- Continuous monitoring of groundwater velocity and direction
- Unattended automatic operation.

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