

Technology Transfer Opportunities: Automated Ground-Water Monitoring

Introduction

A new automated ground-water monitoring system developed by the U.S. Geological Survey (USGS) measures and records values of selected water-quality properties and constituents using protocols approved for manual sampling. Prototypes using the automated process have demonstrated the ability to increase the quantity and quality of data collected and have shown the potential for reducing labor and material costs for ground-water quality data collection.

Automation of water-quality monitoring systems in the field, in laboratories, and in industry have increased data density and utility while reducing operating costs. Uses for an automated ground-water monitoring system include, (but are not limited to) monitoring ground-water quality for research, monitoring known or potential contaminant sites, such as near landfills, underground storage tanks, or other facilities where potential contaminants are stored, and as an early warning system monitoring ground-water quality near public water-supply wells.

About the Invention

The automated monitoring process is designed to: provide reliable data indicating ground-water quality, follow proven ground-water sampling protocols, regulate its performance through system feedback, and communicate data and system performance through remote communications. Changes in properties such as water temperature, specific conductance, and pH can indicate changes in ground-water quality. Therefore, a record of relatively frequent measurements of water-quality properties and/or constituents collected at a monitoring site can indicate

when ground-water quality is changing and can put laboratory analysis of periodic discrete samples into context. The process is designed to meet rigorous ground-water sampling protocols developed by the USGS National Water-Quality Assessment Program that require monitoring and recording water-quality properties and constituents in water pumped from the well or multilevel sampler until purge criteria have been met. The automated monitoring process utilizes feedback to monitor the status of the system and to record and communicate problems if an error is detected. The ability of the automated system to respond to or initiate communications allows human operators to check the system or monitor ground-water quality from a remote site without costly field visits.

A prototype using automated monitoring process operated successfully between May 10 and November 13, 1996, and sufficient quality assurance/quality control data were collected to demonstrate that the data obtained by the automated method was equivalent to data obtained by manual sampling methods using the same protocols. The automated monitoring system successfully documented short term changes in hydrologic and geochemical conditions resulting from the discharge of the sewage plant effluent, and also documented water-quality trends as the ground-water system began to recover from the discharge.

Advantages

The USGS automated ground-water monitoring system provides high-quality

data on a real time basis with enough detail to detect the abrupt arrival of pollutants and to statistically indicate the existence of trends in water quality. This new process is better than available methods because:

- This system purges the well before acquiring final values. Although it is generally recognized that the quality of water within a well, and in close proximity to the well, is probably not representative of ground-water quality in the aquifer, available ground-water quality monitoring systems use passive monitoring devices suspended in a monitoring well.
- This system uses proven sampling protocols expected for manual sampling, and yet does not incur high labor and laboratory costs for each measurement because samples are only collected when necessary.
- The high quality of records obtained is facilitated by system feedback loops and the remote communication capability of the system. Detection of trends or abrupt changes in water quality can prompt a site visit for manual calibration, check measurements, and testing. System operators can respond to real changes in ground-water quality, or perform system maintenance depending upon results of the manual field measurements.

Patent Status

A patent application has been submitted on this process and apparatus. It is now available for licensing.

For More Information

For more information about licensing of this and other patents and for cooperative research opportunities with the USGS please contact:

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