

ITRC PROJECT PROPOSAL: An Overview of Sensors for Environmental Monitoring of Groundwater

PROPOSAL DATE: October 31, 2008

Please use brief statements or bullet items to input the requested information.

Proposal Contact:

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Problem Statement (why is this project necessary?)

- The environmental community has focused its attention on developing analytical methods that can achieve high levels of resolution, sensitivity, precision and reliability. This approach to environmental sample analysis involves collecting a discrete sample, and subsequently analyzing that sample by a regulatory-approved analytical method within a defined timeframe. This traditional approach may be adequate for situations where the contaminant concentration variability is known to be low. For those situations where the variability is expected to be high, or is unknown, the traditional approach may not be adequate.
- Lack of regulatory acceptance of a viable sensor technology discourages further development, use and validation of technology. In turn, limited application and validation discourages regulatory acceptance. This type of scenario is ideal for the ITRC to bridge the regulatory acceptance-commercial development gap.
- Sensors used for groundwater monitoring are capable of collecting appropriate data under variable conditions. For example, in certain conditions - monitoring of municipal wells near an industrial complex, sampling in remote areas that are difficult (even dangerous) to access, monitoring where human exposure to chemical sampling is an issue – sensors may be the preferred choice to more traditional sampling collection. Data acquisition can be frequent and can occur over long periods of time, and operators need not be present during most or all of the data collection cycle. The quantity of data points is greatly increased and can lead to increased confidence in decisions that are based on the data.
- Recent advances in sensor technology provide capabilities to detect essentially a full range of contaminants of interest in groundwater. These capabilities are not fully appreciated by the environmental community. Advances in sensor systems for groundwater monitoring include: the ability to combine wireless communications with sensors, miniaturization of the sensor, communications instruments, and improvements in power consumption. These advances present greater opportunity for the usage of sensors for environmental monitoring.

Solution / Impact (how will the project impact the environmental marketplace?)

- Help the environmental community appreciate the capabilities of sensor system technologies for groundwater monitoring. Sensor systems have the ability to augment or replace the often-expensive, labor-intensive approach currently used to acquire data, with a more direct approach.
- Regulatory acceptance will in turn encourage the sensor industry to develop better sensor systems specific to environmental solutions.
- Critical regulatory concerns regarding data acceptability, data management, data comparability, data quality, and quality assurance can be overcome by familiarizing regulators with the sensor systems through this document.

Success Measures (how you determine the project impact to the market place)

Effectiveness would be measured by:

- Broader regulatory acceptance of sensor systems and inclusion in the regulatory process.
- Increased application of effective sensor systems in groundwater monitoring.
- Significant numbers of environmental professionals referring to this overview document to familiarize themselves with the different types of sensor technology available for groundwater monitoring.
- A number of future projects, directly influenced by this document, that are launched to provide additional, published case study information.

Summary of Deliverables (primary project outputs)

- The expected product would be completion of a partially developed Overview document that details emerging sensor systems.

Project Schedule

- A significant amount of research, time and effort has already been expended on this endeavor.
- A draft version of an Overview of Sensors for Environmental Monitoring has been reviewed by various environmental agencies and comments internalized by the Sampling, Characterization, and Monitoring (SCM) team. As a result of the comments, the SCM team developed a new outline and narrowed the focus to cover emerging sensors for groundwater monitoring.
- The revised document is attached. Following a review by state, federal and other partners, the document can be delivered within three months.

Target Audience

- The target audience is environmental regulators interested in obtaining basic knowledge about sensor operations, uses, limitations, and typical regulatory concerns. Additional interested parties may include federal partners, stakeholders, responsible parties, and consultants.

Resources Required

Personnel:

Team Leader and Five States that are interested in supporting this Project.

- Keisha Long, SC Department of Health and Environmental Control, Engineering Associate
- Dr. Jim Shirazi, OK Department of Agriculture, Hydrologist
- Gena Larson, WI Department of Commerce, Hydrogeologist
- Julieann Warren, MO Department of Natural Resources, Chemist
- Morgan Price, DE Depart. of Natural Resources and Environmental Control, Environmental Scientist
- Amy Bowman, NJ Department of Environmental Protection, Research Scientist
- Brad Call, US Corps of Engineers, Engineer
- Kirby Biggs, US EPA, Senior Analyst
- Kathy Owens, Paragon Professional Associates, Public Stakeholder
- Mary Jo Ondrechen, Northwestern University, Tribal Stakeholder

Financial Resources:

- A maximum of \$10,000 will be needed to complete and publish the document.

Related Work:

- This project is expected to relate well with the SCM team's previous work on Direct Push Wells for Long-Term Groundwater Monitoring in that sensor devices are typically deployed to the subsurface via groundwater monitoring wells.