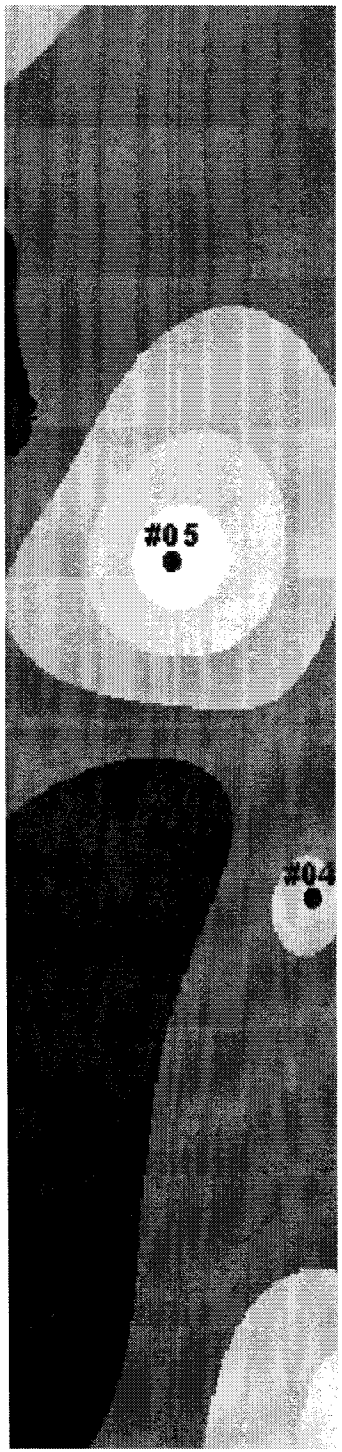


Groundwater Information Management for Enhanced Aquifer Utilization or The Future of Groundwater Management for "Continuous Improvement"

Summit Envirosolutions

EPIPHINY

AQUA TRUEVUE

WATER POLICY INTERIM COMMITTEE
MAY 11, 2010
EXHIBIT 9

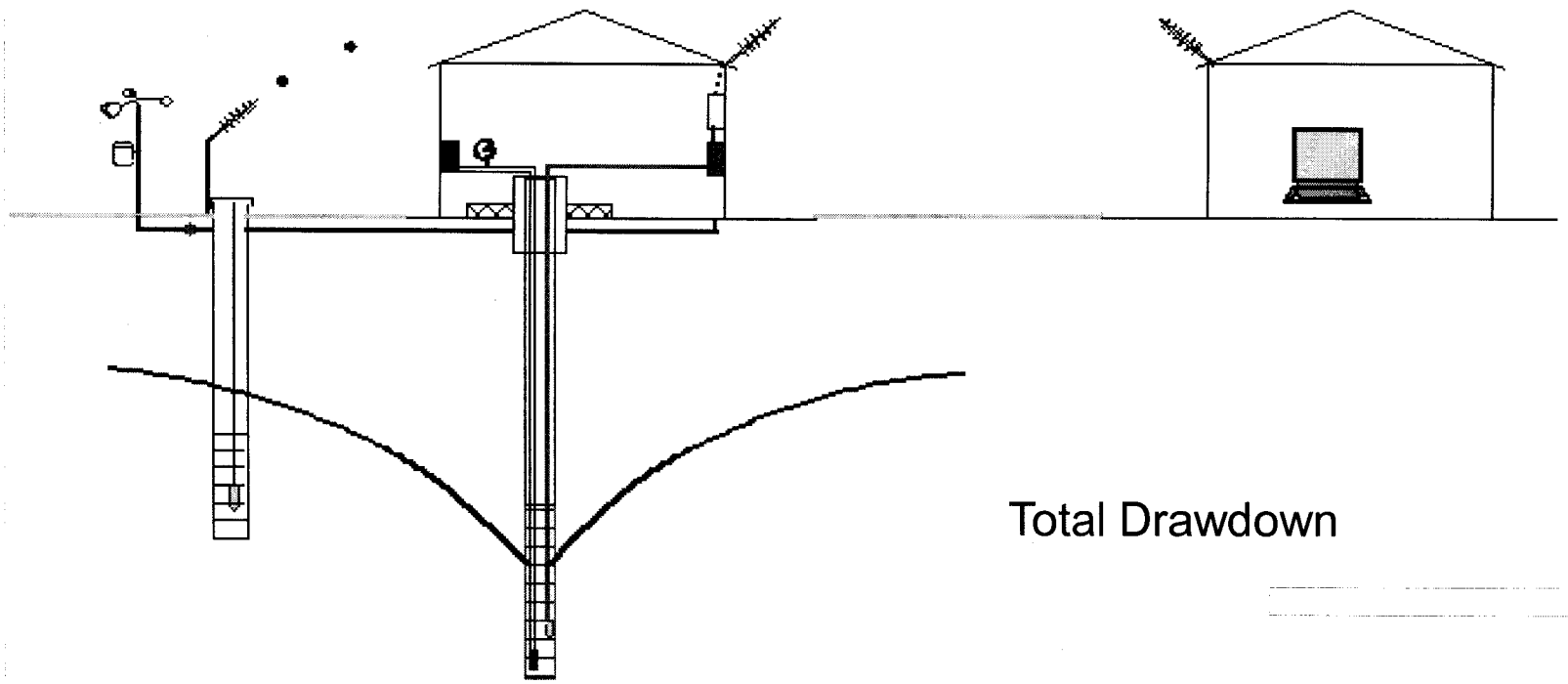
Developing Technology Areas for Water Resource Management

- Wireless data telecommunications and solar power
- Digital water parameter sensors (e.g. water level, temperature, conductivity, nitrate, etc)
- Internet resident software and data applications – "cloud computing" with GIS and databases

Developing Technology Areas for Water Resource Management (cont.)

- Spatial data analysis software for visualization – advanced kriging algorithms
- Supervisory Control and Data Acquisition (SCADA) and chip technologies
- Artificial Neural Networks (ANN)

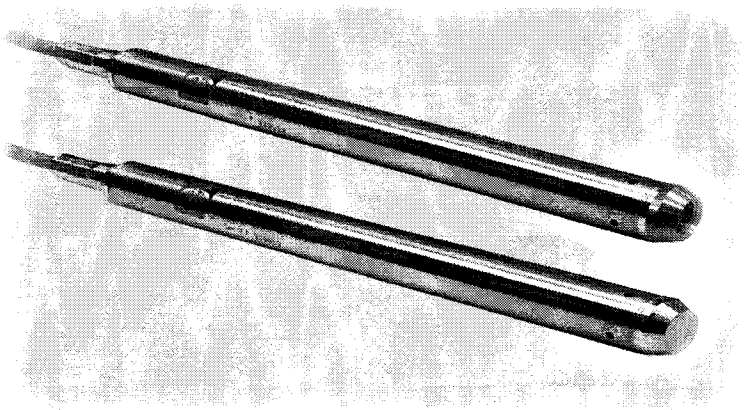
Process Schematic



Total Drawdown

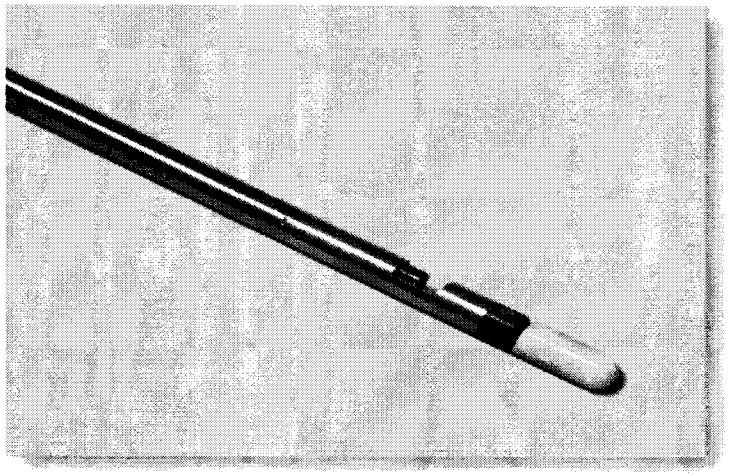
Electronic Data Collection Field Instrumentation

Digital and Analog Pressure Transducers For Water Level Measurement



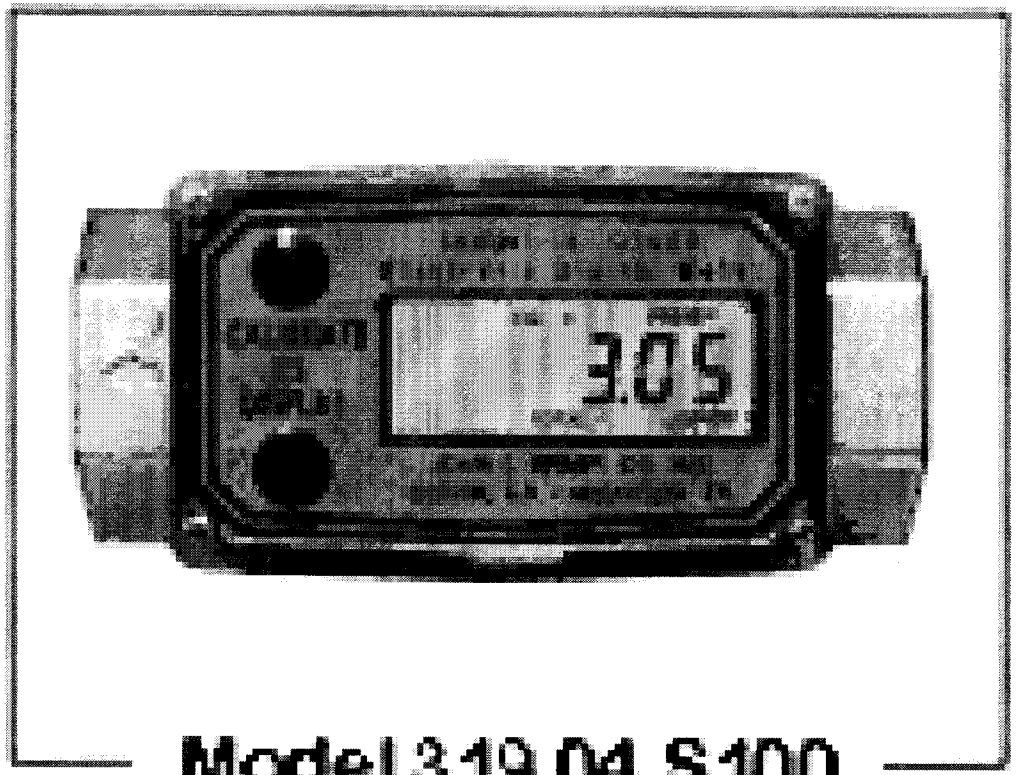
Multi-Purpose In Well Probes

- Temperature
- pH
- Dissolved Oxygen
- Electrical Conductivity
- Chemical Specific Probes



Electronic Data Collection Field Instrumentation

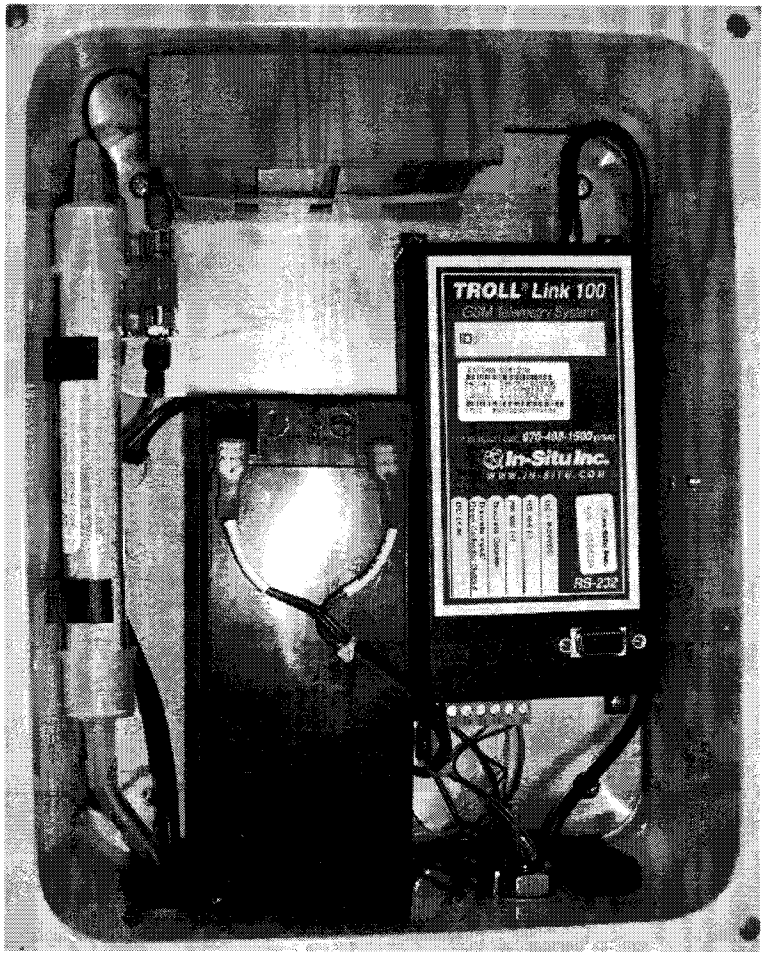
Digital Flow Meters andTotalizers



Model 319 04 S100

Electronic Data Collection Field Instrumentation

Wireless Telemetry



Software Needs

- Pipeline to continuous data
- Database engine – EPIPHINY
- AQUA TRUEVUE – analyzes historic and real time data for well indicators and hydrogeologic conditions

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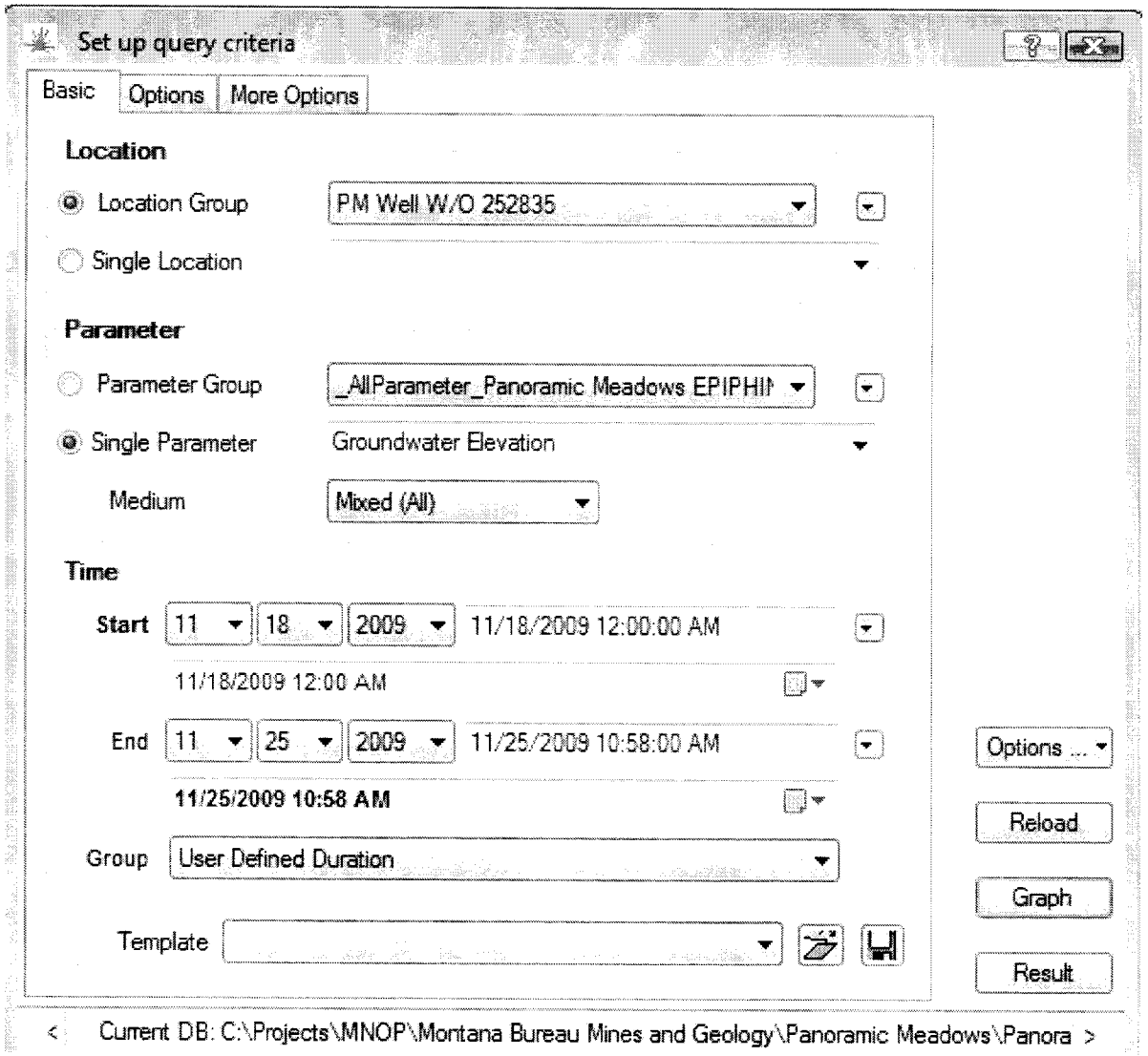
Data Query



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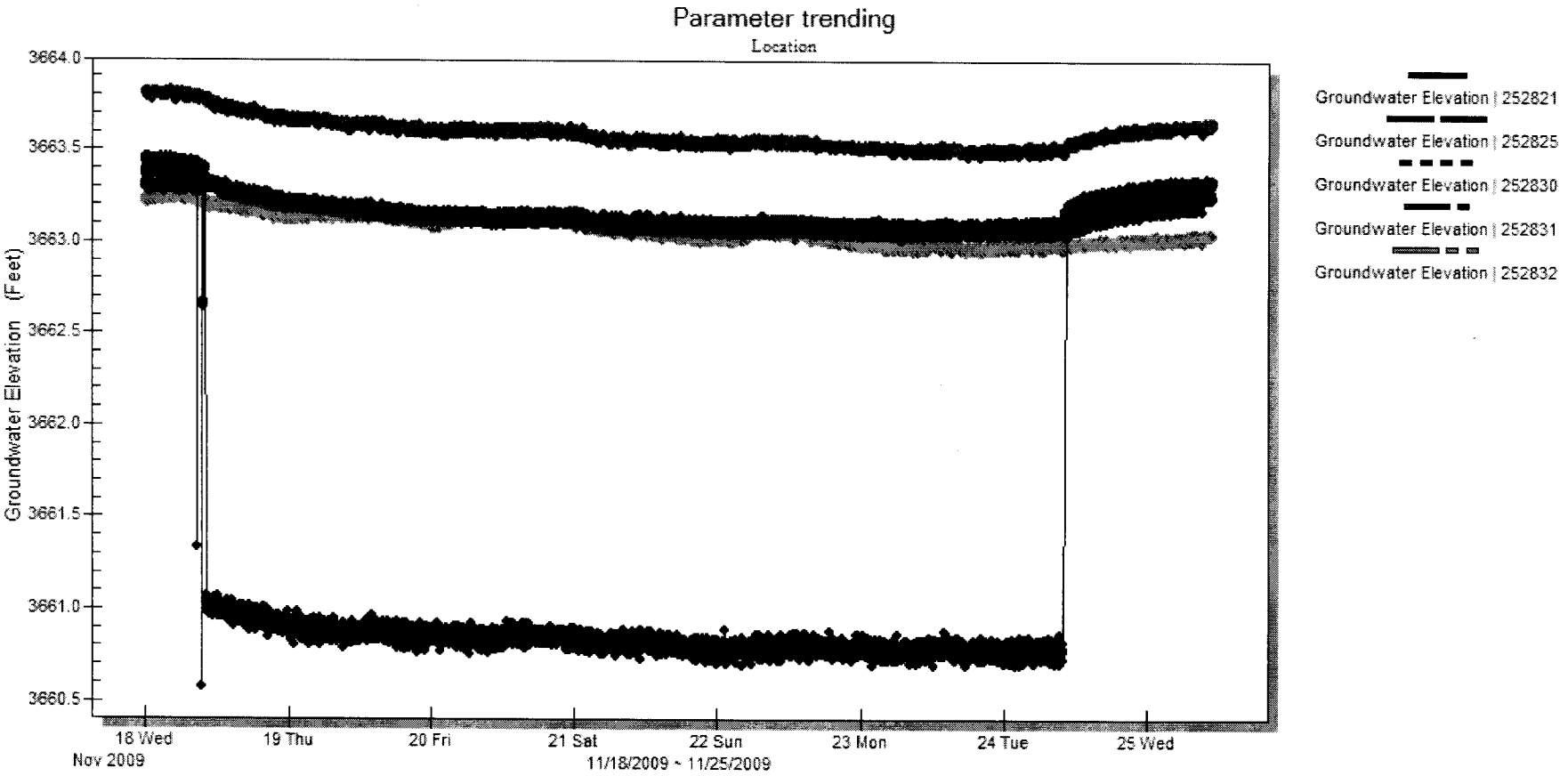
Data Trending



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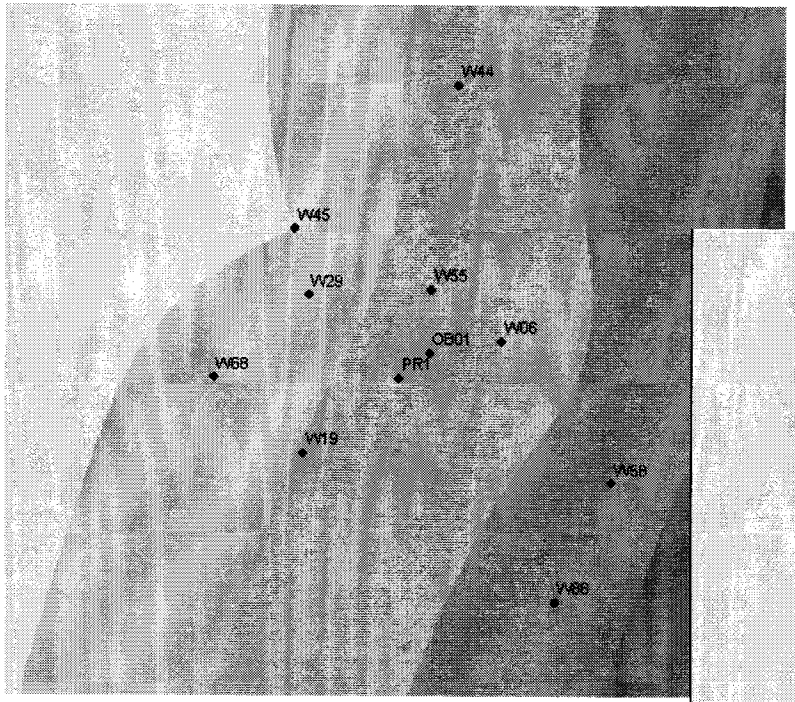
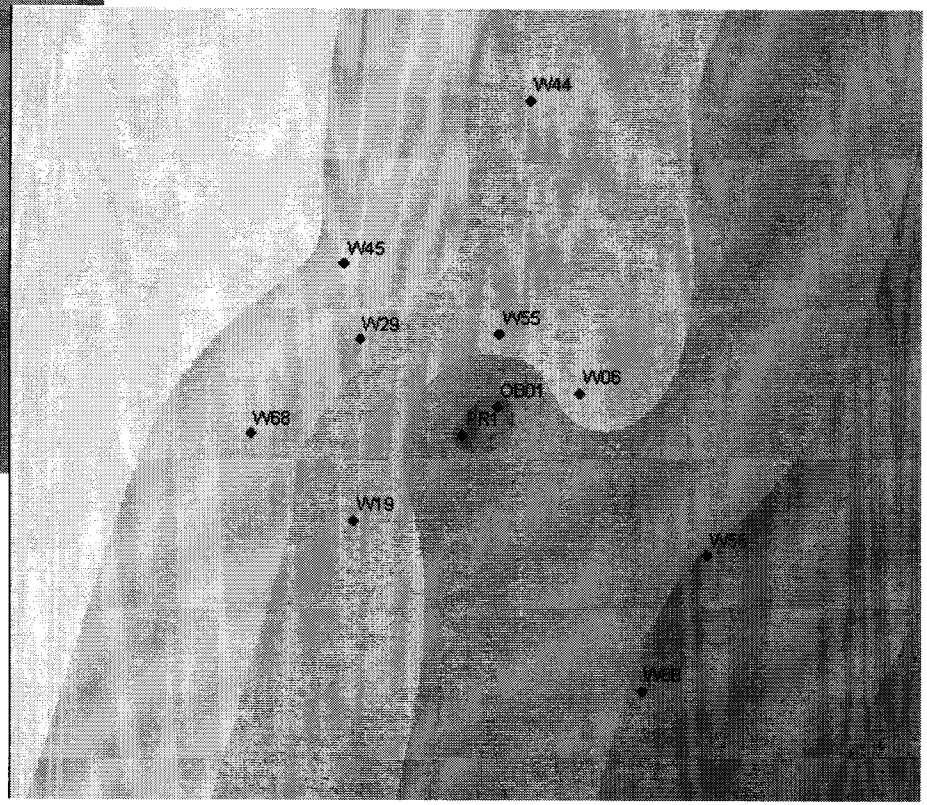
- On-the-fly wellfield diagnostic tool to save energy and operating costs – creates "smart" wells
- Analyze groundwater potentiometric surfaces using pumping well physics
- Work in true elevation not drawdown
- Map groundwater flow paths and capture areas based on data – not a model

Automated Potentiometric Surfaces



Static Conditions



Pumping Conditions (Linear Log Kriging)

Existing Field Applications

- **Municipal** - energy reduction, well dynamics, well placement, well operation and optimization, rights management, remediation/plume management, permitting and compliance

- **Mining/Coal Bed Methane** – dewatering, tailings management, remediation/plume management, permitting and compliance

Existing Field Applications (cont.)

- **Industrial Water Supply** - energy reduction, well dynamics, well placement, well operation and optimization, remediation/plume management, rights management, permitting and compliance

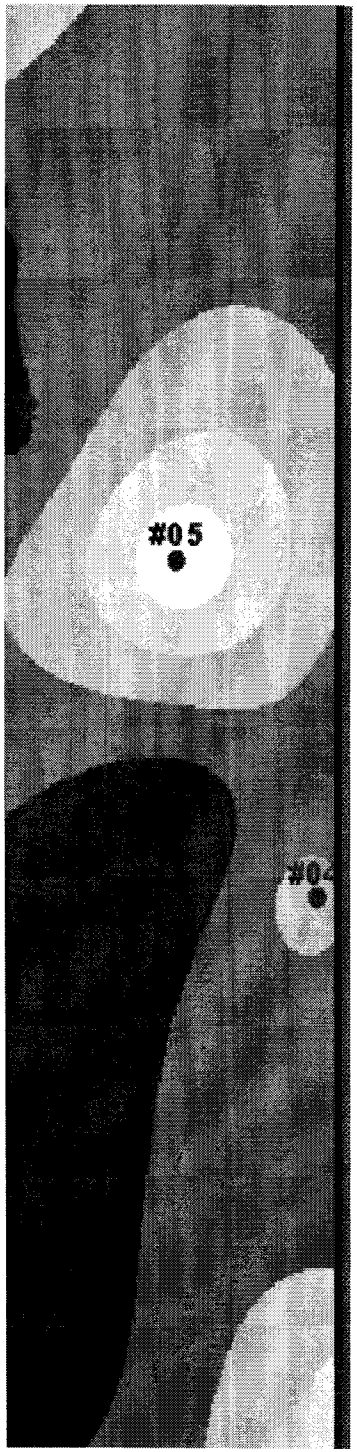
- **Agricultural** – irrigation, water rights protection, well placement and operation, permitting and compliance

Summary

- Sensors are and will increasingly become available for a wide range of parameters along with remote reliable remote power sources
- Wireless communications are increasing in coverage
- Computing power and internet speeds enable real-time visualization, evaluation and management

Summary (cont.)

- Combining relational databases and GIS makes spatial analysis of continuous data streams fast and efficient
- The ability to control and continuously monitor aquifer and well field operating conditions can lead to "smart" models that learn over time how the system will respond



Questions?

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