

# Minnesota Ground Water Association Fall 2004 Conference – November 16, 2004 Management and Analysis of Ground Water Data

*Keynote Speaker*

**James Reed, RockWare Inc.**

## **Presentation**

*Overview of Geologic Data Management - Nailing Jelly to a Tree*

## **Education**

1975-1978: Washington University, St. Louis, Missouri, B.A. in Geology

1974-1975: University of Wyoming

## **Experience**

1984-Present: RockWare Incorporated- Director of R&D / Owner / Founder

1991-Present: NecroSearch International ([www.necrosearch.org](http://www.necrosearch.org)) -Geology, Geophysics & Data Analysis

1995-1996: National Law Enforcement Technology Transfer Council - Advisory Board of Directors

1982-1984: Wold Exploration - Chief Geologist

1980-1982: AMAX Exploration - District Geologist

1978-1980: Freeport Exploration - Project Geologist

1976-1978: NASA - Research Assistant (Viking Project)

## **Geoff Delin, U.S. Geological Survey**

### **Presentation**

*Real-Time Water Level and Stream Flow Data Acquisition*

### **Overview**

- USGS real-time stream flow data acquisition network
- USGS real-time ground-water level data acquisition network
- Example applications of real-time GW level data
- Future plans for USGS real-time monitoring in Minnesota
- Summary and benefits

### **Education:**

Bachelors (Geology), University of Minnesota, 1976

### **Experience:**

1979-present, U.S. Geological Survey, Water Resources Discipline (Hydrologist)

1977-1979, E.A. Hickok and Associates (Geologist)

### **Licenses/Certifications:**

Certified Professional Hydrogeologist, American Institute of Hydrology

Licensed Professional Geologist, State of Minnesota

### **Affiliations**

American Geophysical Union (AGU)

American Institute of Hydrology (AIH)

Geological Society of America (GSA)

Minnesota Ground Water Association (MGWA)

National Ground Water Association (NGWA)

**John Dustman, Summit Envirosolutions Inc.**  
*Management and Analysis of Groundwater Data*

**Abstract:**

The combination of disparate yet converging technologies presents exciting opportunities to enhance the use of science for understanding and managing water resources. The evolving nature of the individual capabilities of the following technologies can be integrated into a powerful tool for addressing water management issues:

- Computer processing speeds
- Global Positioning Systems (GPS)
- Aerial and satellite imagery
- Chemical and physical parameter sensors
- Solar power
- Wireless telecommunications
- Supervisory Control and Data Acquisition (SCADA)
- Geographic Information Systems (GIS) software (RealFlow)
- Automated Neural Networks (ANN)
- Groundwater modeling software
- Database and internet programming (GEMS)
- Data visualization and rendering (VAR) software

Field applications of these technologies have been demonstrated at a municipal water supply wellfield, a groundwater remediation system at a petrochemical storage facility, and a mine tailings disposal facility. This presentation will present the overall concepts of integrating these technologies with examples of actual field applications. A wellfield simulator apparatus will be used to demonstrate the ability to display groundwater elevations and conductivity in real time. In addition, this presentation will present a vision of the future ramifications for water resource management of the ongoing advances of these technologies.

**Education:**

B.S. Earth Science (Geology Option) Montana State University, 1984  
Undergraduate Geology, University of Delaware, 1978-1980

**Experience:**

1991-Present, Summit Envirosolutions, Inc. (Geologist, Vice President, President, CEO)  
1990-1991, Terracon (Senior Hydrogeologist)  
1988-1990, Leggette, Brashears & Graham (Hydrogeologist)  
1987-1988, Twin City Testing (Hydrogeologist)  
1984-1987, Minnesota Department of Transportation (Geologist)  
1981-1984, EG&G Continental Laboratories (Geologist)

**David Odd, Campbell Scientific**

**Presentation**

*Implementing Wireless and PDA Technology in Remote Data Acquisition*

- Review current options for collecting data from remote sites
- Discuss future trends in telemetry

**Education**

BS Watershed Science, Utah State University

## **Melinda Erickson, PE, University of Minnesota**

### **Presentation**

*Beyond the Minimum:*

*Purposefully Designing (or Redesigning) Ground Water Sampling Schemes*

### **Abstract**

Consider collecting extra samples when any of the following are true:

- The cost of being wrong is very high
- The cost of being wrong is sufficiently higher than the cost of additional sampling
- The need for better understanding is great
- The cost of extra sampling is low and the likelihood of increasing understanding is high

Before collecting extra samples, do the following:

- Identify the specific reason/need for collecting additional samples
- Run the numbers – cost/benefit
- Talk to the right people (technical experts, regulatory contact, client, etc.)
- Design the sampling scheme to meet the need
  - ❖ More frequent samples?
  - ❖ Different analytes?
  - ❖ Different location or depth?

### **Education:**

Ph.D., Water Resources Science, University of Minnesota, anticipated in early 2005

M.S., Civil Engineering, University of Minnesota, 1992

Bachelor of Geological Engineering, University of Minnesota, 1990

### **Experience:**

2001 – present, Research engineer, University of Minnesota

1998 – 2000, Hydrologist, Minnesota Department of Health

1993 – 1997, Project manager and project engineer, RETEC

## **Brian Johnson, Minnesota Department of Health**

### **Presentation**

*Minnesota County Well Index Online*

- County Well Index History
- Future enhancements to County Well Index
- County Well Index Online demonstration

### **Education**

B.A. (geology), University of Minnesota

### **Experience**

1992 - present, Minnesota Department of Health (Geographic Information Systems Administrator)

1983 - 1992, Minnesota State Planning (project manager)

## **James Reed, RockWare Inc.**

*Three-Dimensional Visualization of Geologic Data - Eye Candy or Scientific Tool?*

*See biographical information above*

# Harvey Thorleifson, MN Geological Survey

## Presentation

### *Implementation of 3D Geologic Mapping*

#### **Abstract**

Geological survey agencies are developing methods for government geological mapping in the post-paper map era. Surficial and bedrock maps are being digitized and reconciled, while multiple generations of legends are being made accessible in a categorized format. Regional 3D geological models that integrate soils and geology, surficial and bedrock geology, as well as onshore and offshore are increasingly in demand as the information, technology, and protocols to build them progress. Applications such as regional groundwater modeling require digitizing, reconciliation, and assembly of a digital elevation model, bathymetry, offshore geology, soils, surficial geology, public domain drillhole and geophysical data, bedrock maps, and existing stratigraphic models typically expressed as structure contours. New stratigraphic modeling, particularly required for surficial unconsolidated deposits in many regions, requires information from cored holes logged by geologists as well as geophysical surveys. These high-quality results are extrapolated laterally using drill hole data, commonly large quantities of water well data of varying resolution and reliability. Much effort is required to adequately georeference the drillhole data, and to parse large numbers of unique lithological descriptions. Stratigraphic modeling methods ideally use all data and an approach that permits judgment in the acceptance or rejection of data, while interpolation and extrapolation are guided by genetic insights. Models are best captured as a grid of predicted stratigraphy profiles that convey expert opinion on interpolation and extrapolation from the data points.

Reconciliation of mapping with that of neighboring jurisdictions is a key step, as is balancing subjective definition of strata with more objective geostatistical approaches to characterizing the heterogeneous physical properties of the strata. Progress is readily achievable in undeformed strata, while deformed strata present far greater challenges. Increasingly, databases of observations and measurements are being retained alongside the interpreted model, and models are being assigned varying confidence levels such that the result is seen not as an end but a means for prioritizing new mapping. Current activity is broadening our reliance not only from paper maps to digital models, but also from plan view maps, to drillhole databases, to 3D models, to dynamic models such as groundwater flow models.

Pressing user requirements demand that geological survey work rapidly advance along this progression.

#### **Education**

Ph.D. (geology), University of Colorado, 1989

M.Sc. (geology), University of Manitoba, 1983

B.A. Hons. (geography, biology), University of Winnipeg, 1980

#### **Experience**

2003-present, Minnesota Geological Survey (director)

1986-2003, Geological Survey of Canada (research scientist)

#### **Licenses/Certifications**

Professional Geoscientist, Ontario

#### **Affiliations**

Geological Association of Canada (past-president)

Canadian Geoscience Council (president)

Geological Society of America (member)

## **Rich Soule, Minnesota Department of Health**

### **Presentation**

#### *Using GIS to Predict Arsenic Over 10 ppb in Drinking Water*

GIS is a powerful tool that can be used to evaluate large data sets Very quickly and produce convincing graphical results. This talk examines how a state wide map of the incidence of arsenic in groundwater over the new MCL was generated based on a simple model and existing data sets. The Immense potential for the generation of errors, self-deception and obfuscation using GIS is discussed and demonstrated.

### **Education**

BA, Geology at Carleton College

MS, Civil Engineering at the University of Minnesota

### **Experience**

20 years of experience in hydrogeology equally split between consulting (Barr Engineering and Geraghty and Miller) and MDH.

### **Licenses/Certifications**

Licensed Professional Geologist, State of Minnesota

(Trying to avoid a P.E.)

### **Affiliations**

Minnesota Groundwater Association (MGWA)

Geological Society of America

National Ground Water association (AGWSE)

Arsenic Lunch Group

## **Robert Tipping, MN Geological Survey**

### **Presentation**

#### *Bringing the Data Together: Improved Characterization of the Prairie du Chien Group*

- Background - geology of the Prairie du Chien Group
- Hydraulic data: borehole to regional scale
- Water chemistry and isotope data
- Specific examples case histories (various)
- Concluding remarks

### **Education**

M.A. (geology), University of Minnesota, 1992

B.A. (History), Carleton College, 1981

### **Experience/Research Interests**

1990-present, Minnesota Geological Survey (senior scientist)

### **Affiliations**

Minnesota Groundwater Association (MGWA)

### **Licenses/Certifications**

Licensed Professional Geologist, State of Minnesota

**Tina Pint, Barr Engineering**  
**Presentation**

*The Use of Public Datasets in Distributed Parameter Groundwater Flow*

*Models in the Twin Cities*

- Overview of the groundwater flow modeling process
- How is data used in groundwater models
- What type of data do we commonly use
- What data do we wish we had

**Education:**

M.S. Geology, University of Wisconsin-Madison, 2002

B.S. Geology, University of Wisconsin-Eau Claire, 1999

**Experience:**

2002 - Current, Barr Engineering Co., Hydrogeologist

**Affiliations:**

Geological Society of America (GSA)

Minnesota Ground Water Association (MGWA)

**Laurel Reeves, MN Department of Natural Resources**  
**Presentation**

*Online Data Retrieval and GIS Data Deli*

**Abstract**

Management and analysis of ground water data require an important element to work...DATA. Presented here are sources of ground water data and other water resources data that are readily available electronically. Data that may be located through the DNR Waters webpage as well as a few other government agency pages are identified. A quick stop will also be made at the DNR GIS Data Deli.

**Education:**

BA Geology, Macalester College

**Experience:**

1981 to present - State of Minnesota, Dept. of Natural Resources, Waters Division, with a short interlude at the Minn. Pollution Control Agency (hydrogeologist/Ground Water Level Monitoring Manager)

1970 to 1980 - Soil Exploration Co./Twin City Testing (geologist)

**Affiliations:**

Minnesota Ground Water Association

**Licenses/Certifications:**

Licensed Professional Geologist, State of Minnesota