**Northwest Water Planning Alliance: From Intergovernmental Agreement to Collaboration**

**Tim Loftus**

Chicago Metropolitan Agency for Planning (CMAP)

233 South Wacker Drive, Suite 800
Chicago, Illinois 60606
(312) 454-0400

[www.cmap.illinois.gov](http://www.cmap.illinois.gov)

TLoftus@cmap.illinois.gov

One of the more substantive outcomes of the three-year regional water supply planning process that produced, *Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan* (CMAP, 2010) was the intergovernmental agreement among county and municipal governments to form the Northwest Water Planning Alliance (NWPA). Composed of DeKalb, Kane, Kendall, Lake, and McHenry County governments and five Councils of Governments that represent over 70 municipalities, most NWPA members are dependent on groundwater. Two members, Aurora and Elgin, also use the Fox River as a source of drinking water. Accomplishments to date are reviewed along with a new three-year strategic plan and current activities in order to raise awareness of the relatively new collaborative among elected officials and others. An appeal is made for community participation in order that this advisory-only organization will succeed in its mission and become a model for voluntary planning and management of shared water resources.

**Aurora: Water that is Second to None**

**Dave Schumacher, P.E.**

Superintendent

Water Production Division

City of Aurora, IL

(630) 256-3250

DSchumacher@aurora-il.org

Aurora, IL’s relationship with using groundwater as a raw water source has been an “on and off again” relationship for years. Currently, the city uses both raw ground and surface water sources for the city’s potable water supply for residents. The use of multiple raw water sources creates a hybrid type of supply which can be both challenging and highly beneficial at the same time. The presentation will provide a background on the potable water supply for the second largest city in Illinois and also discuss some of the practical issues, including benefits and difficulties, with using groundwater as a raw water source.

**Mt. Simon Says?**

**Jeffrey W. Freeman, P.E., CFM, LEED AP**

Vice President

Engineering Enterprises, Inc.

52 Wheeler Road

Sugar Grove, IL  60554

(630) 466-6718

[www.eeiweb.com](http://www.eeiweb.com)

jfreeman@eeiweb.com

Groundwater dependent communities in northern Illinois are increasingly concerned with finding groundwater sources that will meet their existing and projected demands.  Accordingly, interest has grown regarding the potential of utilizing alternative groundwater sources, including the Mt. Simon sandstone aquifer of the Cambrian system.  In response to an increased water works system demand of 3,000 gpm for the Village of Hampshire in northwestern Kane County, Illinois, Engineering Enterprises, Inc. (EEI) determined that three (3) wells would be drilled, which would utilize the Ironton-Galesville sandstone formation.  Due to abnormally high combined radium results from these wells, it was determined that one of the wells (Well No. 12) would be deepened to utilize the Mt. Simon aquifer.  During the deepening of this well, the Eau Claire formation, which is a basal sandstone regionally located between the Ironton-Galesville and Mt. Simon formations, also showed potential for a source of water capacity.  Extensive testing was performed to investigate the water capacity and quality capabilities of different combinations of the Ironton-Galesville, Eau Claire, and Mt. Simon formations.  This testing shows that, in this well, a combination of the Eau Claire and Mt. Simon formations provides a water source that has better overall characteristics for capacity and quality than the Ironton-Galesville formation.

**Available Water Supply from the Deep Sandstone Aquifers of Northeastern Illinois**

**Daniel Abrams**

Groundwater Flow Modeler

Illinois State Water Survey

Prairie Research Institute

University of Illinois

2204 Griffith Drive

Champaign, IL 61820-7495

(217) 244-1520

[www.isws.illinois.edu](http://www.isws.illinois.edu/)

dbabrams@illinois.edu

Groundwater withdrawals from deep sandstone aquifers in Northeastern Illinois have led to a decrease in potentiometric heads since pre-development times. As heads continue to decrease in areas of high withdrawals, the potential for partial desaturation of the deep aquifers increases. Partial desaturation may lead to water quality or quantity issues. A groundwater flow model of the region indicates that partial desaturation of the deep sandstone aquifer currently exists and will continue to expand out to 2050. This model was used to examine a number of hypothetical future pumping scenarios developed by the Illinois State Water Survey, in conjunction with the Northwest Planning Alliance. These scenarios were designed to eliminate the zone of partial desaturation in the deep sandstone aquifers. In this presentation, I will discuss a number of these model results and what they tell us about available water supply in Northeastern Illinois.

**Groundwater Resources for Public Supply:**

**A Case History of Planning, Development, Management, and**

**Public Education, Fort Madison, Iowa**

**Greg Brennan, P.G., P.HG.**

HR Green, Inc.

8710 Earhart Lane SW

Cedar Rapids, Iowa 52404

(319) 841-4383

gbrennan@hrgreen.com

The City of Fort Madison, Iowa was facing a potable water crisis in 2006. The original water treatment plant built in 1916 had a capacity of 3.8 MGD and exhibited deteriorated infrastructure and severe deficiencies, including compliance issues with respect to treatment of surface water, insufficient supply redundancy for high demands, and treatment capacity limits for meeting future demands. A new 6.0 MGD groundwater source of supply and a new water treatment plant were needed to provide safe drinking water to the public and sufficient quantity to industrial users. Reconnaissance of a 24-square mile area of the Mississippi River valley was conducted to identify the new well field supply. Proactive well field management and source water protection efforts seek to mitigate potential nitrate issues.

**Physical Constraints on CO2 Sequestration in**

**Low-Volume Basalt Reservoirs**

**Ryan Pollyea**

Assistant Professor

Department of Geology & Environmental Geosciences
Northern Illinois University
(815) 753-7851
rpollyea@niu.edu

Deep basalt formations have been proposed as target reservoirs for carbon capture and sequestration on the basis of favorable CO2-water-rock reaction kinetics suggesting that carbonate mineralization may occur on timescales as small as of 102 – 103 days. Nevertheless, there exists a great deal of uncertainty surrounding the influence of basalt formation heterogeneity on commercial scale CO2 injections. In the work presented here, I use a Monte Carlo numerical modeling experiment of CO2 injections into synthetic, east Snake River Plain basalt reservoirs to investigate the influence of *a priori* unknown property distributions on injection pressure accumulation, geomechanical reservoir integrity, and vertical CO2 migration. Results suggest that 1) formation heterogeneity strongly influences the rate and magnitude of injection pressure accumulation within the first month of injection; 2) for an extensional stress regime (as exists within the ESRP), shear failure is unlikely for minimum horizontal compressive stress (Sh) greater than 60% of the vertical effective stress (Sv), and; 3) the mean vertical CO2 mass flux is less than 5×10-4 kg/s at 800m depth after 20 years suggesting that carbonate precipitation rates described in the literature may be adequate for CO2 mineral trapping prior to widespread escape.

**Microbial Communities and Groundwater Chemistry in Pristine and Contaminated Environments**

**Ted Flynn**

Research Scientist

Argonne National Laboratory

University of Chicago

9700 S. Cass Ave.

Argonne, IL 60439

ted.flynn@gmail.com

Besides containing distinct physical phases of groundwater and sediment, aquifers are commonly segmented into geochemical zones where groundwater displays a characteristic chemical composition. While these zones are often thought to reflect the activity of a single, predominant group of microbes such as iron reducers or sulfate reducers, metagenomic analyses (including as those based on the 16S rRNA gene) commonly find diverse communities of different microorganisms regardless of how the groundwater is classified by geochemical criteria. For example, in the Mahomet aquifer of central Illinois, cloned sequences most closely related to the sulfate-reducing genera *Desulfobacter* and *Desulfobulbus* represent 20% of the bacterial community in wells where the concentration of sulfate in groundwater was high (> 0.2 mM) compared to only 3% in wells with less sulfate. Sequences related to the genus *Geobacter*, a genus containing ferric-iron reducers, were of nearly equal abundance (15%) to the sulfate reducers under high sulfate conditions, however their relative abundance increased to 34% when sulfate concentrations were < 0.03 mM. Also, in areas where sulfate concentrations were <0.03 mM, archaeal 16S rRNA gene sequences similar to those found in methanogens such as *Methanosarcina* and *Methanosaeta* comprised 73–80% of the community, and dissolved methane ranged between 220 and 1240 μM in these groundwaters. In contrast, methanogens (and their metabolic product methane) were nearly absent in samples collected from groundwater samples with > 0.2 mM sulfate. In other wells, however, the archaeal community was dominated by sequences most closely related to a group of archaea thought to anaerobically oxidize methane, a potentially critical redox process little discussed outside marine systems. Therefore metagenomic techniques offer hydrogeologists a powerful tool to better understand redox processes in the aquifers, particularly with respect to cryptical redox cycles which may not be observed though traditional geochemical monitoring.