Illinois Groundwater Association

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2003 Fall Meeting

October 16, 2003
Holiday Inn Express
Joliet, Illinois

Agenda and Abstracts

FINAL AGENDA

ILLINOIS GROUNDWATER ASSOCIATION

2003 FALL MEETING

OCTOBER 16, 2003

8:30-9:15	Registration with refreshments
9:15-9:25	Opening Remarks: **Ed Mehnert**, IGA Chair

Session 1

9:25-9:45	**Dennis Duffield**, City of Joliet, *Joliet's Water and Wastewater Development Program 2003: A Plan to Meet the Future Water and Wastewater Needs of Joliet*
9:45-10:05	**Rick Cobb**, Illinois Environmental Protection Agency, *New Internet-Based GIS Tools for Protecting Public Health and the Environment*
10:05-10:25	**George Roadcap**, Illinois State Water Survey, *Potentiometric Surface of the Silurian Dolomite in Northeastern Illinois*
10:25-10:35	**Break**
10:35-10:55	**Stu Cravens**, Kelron Environmental, *Landfill Wars: Politics, Money and the Silurian Dolomite Aquifer*
10:55-11:15	**Kelly Warner**, US Geological Survey, *USGS Arsenic Fact Sheet*
11:15-11:35	**Al Wehrmann,** Illinois State Water Survey, *Assessment of Arsenic in Groundwater and Protecting the Groundwater Supply for Port Byron, Illinois*
11:35-11:55	**Subhash Bhagwat**, Illinois State Geological Survey, *Economics of Water Resources in Illinois*
11:55-1:00	**Lunch**

Session 2

1:00-1:20	**Don Mikulic**, Illinois State Geological Survey, *Thornton Quarry Geology and Its Role in the Chicago Stone Industry*
1:20-2:00	**Joe Sobanski,** Metropolitan Water Reclamation District of Greater Chicago, *Tunnel and Reservoir Plan (TARP) Design and Performance*
2:00-2:20	**Business meeting and open mic for announcements to the Association**
2:20-2:30	**Break**
2:30-3:00	**Craig Rawlinson**, STS Consultants, Ltd., *Groundwater Protection Evaluation - Chicago Underflow Plan (CUP) McCook Reservoir*
3:00-3:20	**Rosa Maria Leal-Bautista** and Melissa Lenczewski, Northern Illinois University, *Sorption of MTBE in Fine Grain Materials From Northern Illinois and Mexico*
3:20	**Adjourn**

Presenters are in bold type

ABSTRACTS
(In order of presentation)

Joliet's Water and Wastewater Development Program 2003:
A Plan to Meet the Future Water and Wastewater Needs of Joliet

Dennis Duffield
City of Joliet
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The City of Joliet is a growing community with major water and wastewater needs. Joliet has been working to comply with the drinking water standard for radium by planning a new water supply from the Kankakee River since 1987. Additional needs for a new wastewater treatment plant and elimination of combined sewer overflows have resulted in a coordinated review of the water and wastewater system needs. This review identified alternatives to the development of the Kankakee River. These alternatives included treatment of existing deep well water. Costs for various alternatives were reviewed with the treatment of deep well water using co-precipitation of radium with hydrous manganese oxide.

The Program has an estimated cost of $100 million to be provided by revenues of the Joliet Water and Sewer Fund.

New Internet-Based GIS Tools for Protecting Public Health and the Environment

Richard P. Cobb, P.G.
Illinois Environmental Protection Agency
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The Illinois EPA is providing drinking water quality data and analyses to the public as part of the Source Water Assessment Program (SWAP). The public water supplies, consisting of 1800 community water supplies and more than 4100 non-community water supplies, are assessed for susceptibility to and potential sources of contamination. In addition to published fact sheets, the USGS and IEPA have developed an interactive mapping geographic information system (GIS) web application for retrieving up-to-date source water data and analyses.

Landfill Wars: Politics, Money, and the Silurian Dolomite Aquifer

Stuart J. Cravens
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Highly contentious public hearings were held in 2002 and 2003 concerning the proposed location of a new solid waste municipal landfill in Kankakee, Illinois. The hearings resulted in conflicts between competing landfill owners, city and county government, geologists, and engineers. The greatest controversy concerned the proposed placement of the landfill directly within the Silurian Dolomite aquifer of northeastern Illinois. How can two consulting firms working for rival sides in a landfill battle come to entirely different conclusions about the geology and hydrogeology of dolomite in an area encompassing less than 1 square mile? This is an inside view of a current, and still unresolved, battle to site a landfill in Illinois.

Assessment of Arsenic in Groundwater and Protecting the Groundwater Supply for Port Byron, Illinois

H. Allen Wehrmann
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Routine sampling of a Byron Woods Subdivision well in 1995 and subsequent sampling of domestic wells revealed the presence of high levels of arsenic (>50 μg/L) in groundwater northeast of the Village of Port Byron, Rock Island County, Illinois. The most viable solution to reduce arsenic in the Byron Woods water is to connect to the Port Byron supply. Port Byron's two municipal wells are completed in the same aquifer as the contaminated wells yet were not known to contain arsenic. Port Byron officials were concerned about the ability to increase the Village's supply capacity to meet the increased demands of the subdivision and, in so doing, increasing the potential for arsenic to migrate into the Port Byron wells.

The Illinois State Water Survey (ISWS) conducted a groundwater sampling and modeling study to assess the potential for Port Byron to safely increase their groundwater supply. Sampling of domestic wells immediately east and south of the two village wells, and the two village wells themselves, showed very low levels of arsenic (~1 μg/L) are present throughout the area, but not in as high concentrations as north of town. Locations south of the two village wells appeared to be the most reasonable area to construct a new well to avoid the area of known arsenic contamination.

However, another concern for placement of a new well is the distortion that the additional pumpage would cause to the capture zone of Well No. 2, the northernmost village well. If the capture zone for Well No. 2 would be shifted such that it would reach out to known areas of arsenic contamination, then other locations, perhaps farther south, for a new third well might be necessary. A computer groundwater flow model of the Port Byron area was constructed to evaluate 40-year capture zone configurations for a variety of pumping scenarios. Modeling analysis shows that a new third well can be safely located approximately 1800 feet south of Well No. 2. A shift in the 40-year capture zones of the two existing wells does occur but these capture zones do not extend into the highly contaminated area.

Tunnel and Reservoir Plan (TARP)

Joe Sobanski
Metropolitan Water Reclamation District of Greater Chicago

In the mid-1960s, metropolitan Chicago began searching for a solution to its substantial combined sewer overflow (CSO) pollution and flooding problems. Within a 375 square mile combined sewer area with over 3 million people, rainfalls as small as 1/3 inch overloaded local sewer systems and caused CSOs – a mixture of raw sewage and stormwater – to spill to area rivers from 476 sewer outfalls. The CSOs severely polluted area waterways, and, with extreme storms, raised flood stages to levels resulting in river backflows to Lake Michigan.

Numerous studies by cooperating agencies led to the Tunnel and Reservoir Plan (TARP, or Deep Tunnel) being selected as the one solution cost-effectively fulfilling State and Federal CSO water quality requirements and meeting three water management goals: protect Lake Michigan – the region's drinking water supply - from river backflows containing raw sewage; improve the water quality of area rivers and streams; and provide an outlet for floodwaters to reduce sewage backup flooding. TARP achieves compliance with the Clean Water Act with respect to CSO control for the City of Chicago and 51 suburban communities.

TARP was officially adopted by the District in 1972 and started under construction in 1975. The large scale, multi-purpose TARP concept – huge, deep rock tunnels and reservoirs that capture, convey and store combined sewage until transferred to treatment plants when capacity becomes available following storms – was unproven at first, but its successful performance and the attainment of many significant side benefits have now made it a model urban water management tool.

Groundwater Protection Evaluation
Chicago Underflow Plan (CUP) McCook Reservoir

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Approximately 66 miles of tunnels comprise the Mainstream and Des Plaines portions of the Chicago Tunnel and Reservoir Plan. The tunnels drain to the McCook Illinois Area where combined sewer overflow is treated at the Stickney Water Reclamation Plant. The CUP-McCook Reservoir will be located at the Lawndale Avenue Solids Management Area between the Des Plaines River and the Sanitary Ship Canal. The reservoir will be approximately 300 feet deep and is designed to reduce flooding in the Chicago area by providing storage of excess runoff during storm events. The reservoir will contain a mixture of sanitary sewage and storm flow that would exceed the capacity of the old sewer systems. The combined sewer overflow (CSO) will be conveyed to the proposed reservoir by the deep tunnel system until the Stickney Water Reclamation Plant can process it.

STS has conducted numerous phases of investigation including mapping of the sidewalls of the existing Vulcan Quarry, collecting rock cores, downhole geophysical surveys, piezometer installation, water level monitoring, geochemical characterization, water pressure testing, aquifer pump testing and most recently

the development of a 3 dimensional groundwater flow model to simulate the performance of the various groundwater protection systems. Based on USACE preliminary evaluations, the following groundwater protection strategies were evaluated using the groundwater flow and particle tracking model.

Grout Curtain;
Grout Curtain and Drainage Adit;
Grout Curtain and Extraction Wells; and
Grout Curtain with Injection Wells.

The groundwater protection technologies were evaluated against each other and against a no action alternative (Reservoir without a Groundwater Protection System). The results of the analyses are being discussed with the IEPA and it is anticipated that a strategy will be selected which will undergo contaminant transport model evaluation and further engineering analysis. This presentation summarizes the findings of the on-going evaluations.

Sorption of MTBE in Fine Grain Materials from Northern Illinois and Mexico

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Methyl *tert*-butyl ether (MTBE) is a gasoline oxygenate that is used to enhance gasoline combustion consequently it reduces the carbon monoxide and hydrocarbons emissions. A report by the U.S. Geological Survey (USGS, 2003) identifies MTBE as one of the most common contaminant of urban aquifers in the United States. Several authors considered MTBE unable to sorb to soils and sediments. However, this study demonstrated the potential for sorption of MTBE in fine grained materials rich in organic matter. The retardation factors obtained from isotherms performed with various concentrations of MTBE and benzene (10, 50, 100, 500 and 1000 µg/L) at 10 °C and 25 °C for glacial tills from DeKalb, Illinois and lacustrine clays from Chalco, Mexico indicated the potential for sorption of MTBE increased when it is in contact with materials rich in organic matter. Furthermore, the presence of fine grain materials showed an increase on MTBE sorption. Lacustrine samples where collected at three different sites that showed similar organic matter content, but the retardation factor for MTBE is different for each site due to the heterogeneity of the sediments. It has been observed that the variation in temperatures does not affect MTBE sorption. This experimental study showed that MTBE sorption could occur in fine-grained soils and sediments with high organic matter content. These results indicate the importance that the geological setting has on the fate and transport of MTBE.