

# Minnesota Ground Water Association

www.mgwa.org

Volume 22, Number 4: December, 2003

## President's Letter

I would like to thank everyone who attended the Fall Conference on water conservation; we had an attendance of nearly 200 people, and a great group of speakers. Robert Glennon, our keynote speaker, mentioned that his book "Water Follies" is available at most bookstores if anyone is interested. I would like to also thank everyone who helped plan the Fall Conference, especially the MGWA board members.

As you know, the MGWA is involved in the Science Museum of Minnesota's 1.2-acre outdoor exhibit space *Science Park*. The museum will be investing over \$4 million dollars to transform this park into an outstanding outdoor educational experience.

MGWA is sponsoring the WaterScapes exhibit, which will include the installation of a water well. The plan is to install the well with a sonic drilling method. Bedrock

cores from the borehole will also be displayed at the exhibit for visitors to see and touch.

The cost estimate for this educational exhibit is \$40,000. We encourage MGWA members to consider making a **tax-deductible** donation to the MGWA Foundation for Science Park. The names of all contributors of \$100 or more will be included on an acknowledgement panel at the display. Please consider this campaign as a way to support our education mission. Perhaps you can send an extra amount along with your 2004 dues payment.

We are fortunate to have Laurel Reeves to run for President-Elect and Jon Pollock to run for Secretary (again!). The ballot is on page 5 in this edition of the newsletter, and for your convenience it is also presented as a separate document at [www.mgwa.org](http://www.mgwa.org). Please send in your vote. Your vote counts.

The Spring Conference – on technical aspects of Minnesota's progress in management of ground water contamination – is coming up **May 4**. That's not as far in the future as you might think! If you have an idea for a case study presentation, would like to suggest a newer cleanup method that should be introduced or a tried and true cleanup method whose performance over time should be reviewed, or if you know of a great speaker we should invite to give a presentation, please contact Chris Elvrum at 651-602-1066.

I am preparing to pass the torch to Chris Elvrum who will assume the duties of President, including this column, in January. The Association is being left in good hands. I've had an exceptional group of people to work with throughout the year and I would like to thank them for their commitment and hard work. This includes Rob Caho, Eric Hansen, Jon Pollock, Gordie Hess, Jeanette Leete, Norm Mofjeld, Sean Hunt, and many others. A special thanks to Rob Caho who has served for the past three years as President-Elect, President, and Past-President. Rob will be missed on the MWGA Board.

*Have a happy and safe holiday season! Marty Bonnell, MGWA President.*



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## 2004 Newsletter Deadlines

Issue	To Editor
March	02/06/2004
June	05/07/2004
September	08/06/2004
December	11/05/2004

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## Capillary Fringe

### Groundwater Management Organizations in Minnesota?

— Steve Robertson

Groundwater resource protection and management needs have started to outstrip the available governmental tools and programs. Current approaches provide only scattered, patchwork responses and many are reactive (remedial instead of preventative) in nature. Examples include well interference issues and cleanup programs. I think many groundwater professionals recognize the need for proactive management, but it is hard to persuade legislators in a time of budget crisis to fund a program with results that are returned over a period of decades rather than months or years. Increasingly, we are looking for holistic approaches to data collection and resource management. I suggest that groundwater (or aquifer) management organizations, akin to the watershed management model used successfully in Minnesota for years, is a framework the state should examine for helping to fund and manage groundwater resources. Aquifer management would be best accomplished by entities with semi-independent taxing authority (along the lines of the current watershed districts) that do not need to make biennial appeals to the legislature.

Here in Minnesota we have Watershed Management Districts and Watershed Management Organizations and one could argue that these, in conjunction with State agency efforts, are sufficient to manage groundwater resources. They're not. Watershed organizations focus on surface water, and for them groundwater is usually an incidental consideration. Most Minnesotans, however, and an overwhelming majority of those in high growth areas of the state, rely on groundwater for their drinking water. In many areas of the state this reliance is threatened by local shortages, interference with other needs, natural and/or anthropogenic water quality concerns, or some combination. Attempts to deal effectively with these sorts of problems are stymied by

problems such as 1) limited jurisdictional control (e.g. wellhead areas extending past municipal boundaries), 2) lack of regulatory control or authority (current regulatory emphasis is largely site-specific and reactive), 3) no consensus with regard to management objectives and, most importantly, 4) insufficient data collection to allow groundwater professionals to make sound, rational resource management decisions. I'll discuss each of these in turn.

First, as we all know, aquifers, and the groundwater that flows in them, rarely honor arbitrary political boundaries. Management authorities that are established locally or sub-regionally, but extend to technically defensible aquifer limits or flow boundaries, make sense to handle conflicting needs. Management concerns will only increase as our activities in recharge zones and our demands for water get more intense.

Second, groundwater as a resource is not typically managed on a system-wide basis in Minnesota. Most regulatory programs operating under existing state and federal authorities have a site-specific emphasis (e.g., how have site activities affected groundwater quality, what is the capture zone of city well no. 1, how does pumping of this well affect water levels in its neighbors). These programs are effective and will continue to play an important role in future management efforts, but they do not meet today's full needs. Traditional approaches do not afford a good means of 1) dealing with the cumulative effect of many distributed, incremental effects on groundwater (e.g., non-point source pollution problems); 2) investigating, predicting and managing quantity issues in areas of scarce resources; and 3) handling issues for which there is not one individual responsible party.

Groundwater management organizations would necessarily need to be regional or sub-regional in scale. In the metropolitan area, using the major rivers as natural boundaries seems appropriate for all aquifer systems from the Jordan on up. Deeper aquifer systems have fewer boundaries and may be harder to break up

— continued on next page

MGWA Newsletter, December 2003

## Membership News and Information Update:

Now ground water information can flow two ways! Our Newsletter can be a forum for every member to share information they encounter. Are you working on an interesting project? Have you come across an interesting fact? Describe something you experienced or witnessed. What progress or developments is your organization making? Have you changed job positions recently? Let's keep our membership in touch with one another! Selected comments will appear in the next issue. Email any and all comments to: [newsletter@mgwa.org](mailto:newsletter@mgwa.org)

### Capillary Fringe, cont.

into sub-regional management areas. Administratively, groundwater management, like watershed management, would have to include substantial local control. A board consisting of local stakeholders and perhaps an independent expert would be required to gain acceptance from affected parties.

Third, while most of us agree that groundwater should be protected to assure adequate quantity and quality of the resource for current and future needs, there is not yet agreement on the means of accomplishing this goal nor on the standards for defining impacts. We have good federal and state programs that establish baseline water quality standards and that establish protections for certain groundwater-dependent natural resources. In the context of these existing regulations, we should let local stakeholders, in the form of a groundwater management organization, focus management goals and direct management and research activities.

Finally, a key component of groundwater management efforts must be basic data collection. Data collection needs necessarily vary from one locale and from one aquifer system to another. Missing in most current efforts is continuity over time. The status of existing information gathering is increasingly inadequate for today's needs. How much does pumping in the Jordan affect the Savage Fen? How has Lakeville's pumping interfered with its neighbors? Is the Vermillion a losing stream near Hastings? What will the effect of a 1988-like drought be on resources supplying the needs of a continually increasing population? Can the existing groundwater resources in the

state meet the needs of growing and shifting population centers? In many areas, however, groundwater quality issues are more important than groundwater flow or quantity concerns. We can only expect to be able to respond intelligently to these types of issues by relying on real data that is collected in a consistent manner over time. Other activities that could serve as useful aids in management include mapping geology, defining geologic-hydrogeologic relationships (e.g., lithostratigraphic controls on aquifer and groundwater characteristics like hydraulic conductivity and naturally occurring water quality parameters such as arsenic and radium), establishing flow (volumetric) budgets, and characterizing water quality and hydrogeologic conditions of local concern.

We should count as blessings the many areas of our state that have ample, high quality groundwater resources. Individual experience up until now has been that most wells produce good quality water in adequate volumes. This good fortune is increasingly being tempered by recent experiences in which limited groundwater resources are restricting growth, groundwater quality is affecting public health, and resource interference is creating financial hardships. Such difficulties will increase as population becomes more concentrated. Not every region, however, faces the same challenges. Groundwater management districts would provide local authorities the flexibility to set their own priorities, within federal and state guidelines, for resource management. Minnesota needs such organizations so that groundwater management can be carried out intelligently, efficiently, and responsibly.

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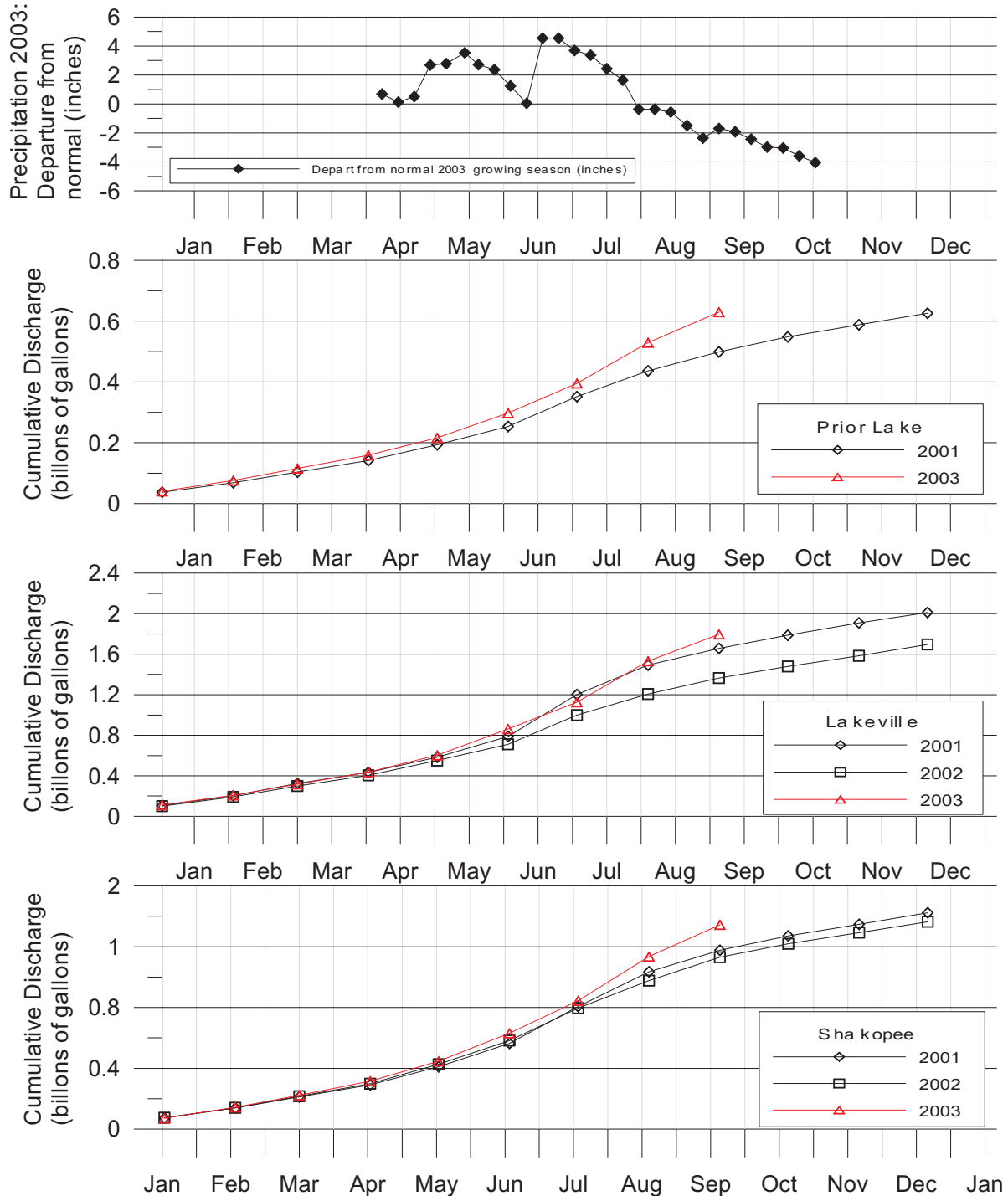
## The primary objectives of the MGWA are:

- Promote and encourage scientific and public policy aspects of ground water as an information provider;
- Protect public health and safety through continuing education for ground water professionals;
- Establish a common forum for scientists, engineers, planners, educators, attorneys, and other persons concerned with ground water;
- Educate the general public regarding ground water resources; and
- Disseminate information on ground water.

# When it's dry, the well runneth...

CUMULATIVE ground water pumping in 2003 through October outpaces pumping from the previous two years for Prior Lake, Shakopee, and Lakeville. During the latter part of 2003, southeastern Minnesota experienced very dry conditions, as evidenced by the uppermost of the four graphs. The lower three show cumulative pumping totals for Prior Lake, Lakeville and Shakopee. Pumping increases observed in each of these communities is probably attributable to growth as well as climatic conditions. In contrast to 2001 when its heavy pumping interfered with many nearby wells, Lakeville in 2003 had instituted voluntary odd-even water use restrictions. Data courtesy of the City of Lakeville (Don Volk), the City of Prior Lake (Makenzie McCormick), the City of Shakopee (John Crooks), the Department of Natural Resources State Water Use Data System, and the Minnesota Climatology Working Group (<http://climate.umn.edu/>).

Contributed by Steve Robertson.





# Minnesota Ground Water Association

## MGWA 2004 Officer Ballot

### Candidates for President-Elect

**Laurel Reeves**

Laurel Reeves is a hydrogeologist with the Minnesota Department of Natural Resources, Waters Division, where she has worked for over 20 years. Currently she manages the state's ground water level monitoring network, which includes about 700 actively monitored locations. Previous duties at DNR include information systems supervision, water appropriation & public waters permits, dam safety grants, public waters inventory, environmental review, public drainage project review, etc. Her DNR career was interrupted for a few years to work on solid waste permits and superfund site investigation with the Minnesota Pollution Control Agency. Her career also includes ten years as a geologist with a private consulting company doing business throughout the Midwest. She earned a B.A. in Geology from Macalester College.

Although the public perception may be that water is plentiful, in reality we know that's not true. In much of our state either the ground water supply is limited or it is challenged by overuse and threatened with contamination. The Minnesota Ground Water Association has been, and must continue to be, instrumental in enlightening policy makers and the public about ground water related issues. I will work to further strengthen our organization's outreach efforts so that informed decisions can be made.

**Write-In**

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### Candidates for Secretary

**Jon Pollock**

I have been, and am volunteering to become Secretary of the MGWA in an effort to support the Association's objectives of promoting and encouraging scientific and public policy aspects of issues related to ground water, protecting the public health and safety through continuing education for ground water professionals, establishing a common forum for scientists, engineers, planners, well drillers, educators, policy makers and all others involved with ground water issues, along with educating the general public and disseminating information concerning ground water.

I am currently President of Frontline Environmental, LLC providing environmental consulting and management service to both the private and public sectors. Previous positions include eight years with the Minnesota Pollution Control Agency as a hydrologist, several years of laboratory experience, as well as environmental consulting and oil and gas exploration work. My formal education includes Bachelor of Science degrees in Geology and Geophysics and a Masters Degree in Geological Sciences. Other current volunteer positions include the Dakota County Solid Waste Management Advisory Committee, MGWA Newsletter Team, and Firefighter for the City of Lakeville.

**Write-In**

**Please copy/print the ballot, select one candidate for each position and send the ballot back by January 2nd, 2004.**

**Return to:  
Minnesota Ground Water Association  
c/o Watershed Research Inc  
4779 126th St N  
White Bear Lake, MN 55110-5910**

## Fall Field Trip: Geology and Hydrogeology of the St. Croix River Valley

With the American Institute of Professional Geologists — Minnesota Chapter as lead, assisted by the Minnesota Ground Water Association, this year's fall field trip held September 26-27, 2003, was an unqualified success. About 90 people enjoyed cool, changeable weather to visit 14 field trip stops on both the Minnesota and Wisconsin sides of the St. Croix Valley from the Twin Cities suburbs to the Hinckley and Grantsburg areas. The trip began Friday morning at Birkmose Park in Hudson, WI, overlooking the beautiful St. Croix Valley. The trip was overviewed by Jim Almendinger of the St. Croix Watershed Research Station of the Science Museum of Minnesota and Keith Rapp of Unisys. Although only about one percent of the valley is currently urbanized, the area is growing fast and is coming under many of the same development pressures currently affecting many Twin Cities suburbs.

Stop 2 was at the St. Croix Boomsite north of Stillwater where the Mazomanie facies of the Franconia Formation is exposed at the river level. Scott Alexander of the University of Minnesota Department of Geology and Geophysics narrated the stop and pointed out a spring emerging from a bedding plane in the Reno Shale within the Mazomanie. The spring recharge timeline here is on the order of 30-50 years. We moved upriver to Stop 3 to Pine Needles Cabin, owned by the St. Croix Watershed Research Station. The cabin is currently used by researchers and artists-in-residence associated with the research station. The beautiful site reminded me of areas much farther north in Minnesota, with stands of large red and white pines, as well as mixed hardwoods along the bluffs. We examined several springs emanating from the bluffs, some of which had spring boxes to serve as a water supply to the cabins in the area. Nitrate levels have been rising in these springs in recent years in response to surrounding land use changes, and now average 1-2 mg/l.



*Keith Rapp, Unisys (in red vest), and Jim Almendinger of the Science Museum's St. Croix Watershed Research Station overview the field trip at the first stop at Birkmose Park in Hudson, Wisconsin*



*Field trippers get a close-up look at the deposits of the Beroun Moraine pushed up in front of the Superior lobe glacier.*

Stop 4 at the Dresser Trap Rock Quarry near Dresser, WI, highlighted the variety of geology one encounters moving north through the St. Croix Valley. Here, Precambrian lava flows of the Chengwatana sequence are mined for "trap rock" used as railroad track ballast and road bed material. This is the southernmost exposed part of the Keweenaw Mid-Continental Rift system. After a lunch stop at a city park in Grantsburg, WI and an encounter by our buses with the local high school football homecoming parade as we left town, it was a return to glacial

geology and dune morphology at the Crex Meadows and Stop 5. Crex Meadows is a 30,000-acre state wildlife management area, much of which was once covered by Glacial Lake Grantsburg 13,000 years ago. As Carrie Jennings-Patterson of the Minnesota Geological Survey pointed out, some of the paleodunes visible on the old lake bed approach 50 feet in height.

North of Grantsburg along the St. Croix, Stop 6 featured a stop at the beautiful Sandrock Cliffs Park in the

— continued on next page

## Field Trip, cont.

Governor Knowles State Forest. The sandstone exposed here was deposited on the extreme northern margin of the Hollandale basin that extends south and east through the Twin Cities to Rochester and beyond. North of this point, erosion and glaciation have removed most of the Paleozoic sedimentary rock leaving behind older, Precambrian bedrock. For Stop 7, it was back across the St. Croix River and into Minnesota for the Rock Creek Sand Quarry, where a sharp contact between the Des Moines lobe till lying atop Superior lobe till could be seen. Stop 8, the last for Day 1 of the field trip was at the Beroun Moraine thrust site, where deformed sediments pushed up in front of the advancing Superior lobe glacier could be seen.

Following a great meal at Grand Casino, Hinckley, we were entertained by three excellent talks, starting with Terry Boerboom of the Minnesota Geological Survey who discussed the Peculiarities of Pine County Geology, based on his mapping experience for the Pine County Geologic Atlas. Pine County truly has

## NGWA Award Winners Include Two MN Projects

Each year the National Ground Water Association recognizes the contributions of individuals who have made significant differences in the ground water professions. The award winners will be officially recognized during the 55th Annual Ground Water Expo held December 9-12 in Orlando, Florida. Among this year's awards and winners are:

**Outstanding Project in Ground Water Protection Award** to Dakota County, Minnesota, for its Hastings Area Nitrate Study, and

**Outstanding Project in Ground Water Remediation Award** to Peer Engineering Inc., Bloomington, Minnesota, for its Horizontal Interceptor Well Project.

More information on these winners and other award recipients can be found at <http://www.ngwa.org/awards/awards.html>.

Source: AGWSE Newszine October 2003

*Editor's note: Early results of the Nitrate Area Nitrate Study were described in Jill Trescott's article in the March 2002 newsletter. The HANS final report is now on-line at <http://www.co.dakota.mn.us/environ/Hans/hans.pdf>*

it all, from an abundance of glacial features, to sandstone caves and sinkholes developed in the Mt. Simon-Hinckley, to the igneous and metamorphic Precambrian rocks of the mid-continent rift that were the focus of Terry's presentation. Scott Alexander of the University of Minnesota Department of Geology and Geophysics followed with a presentation on the Hydrostratigraphy of

Southeast Minnesota Paleozoic Bedrock Geology, using hydrologic properties to define rock units, and investigating primary, secondary and even tertiary porosity developed in these rocks. Jim Berg of the Minnesota Department of Natural Resources concluded the evening with a talk on Using Resistivity to Define the Hydrogeology of Southern Pine County. Jim mapped the glacial

geology of Pine County for the geologic atlas, and his presentation showed how resistivity can be used to a depth of about 50 feet to define buried glacial features such as meltwater channels and eskers.

We started the day Saturday with Stop 9 at Robinson City Park in Sandstone. The park is in an abandoned quarry in the Hinckley Sandstone with well-developed fractures that act as drains for the numerous sinkholes in the Banning area. Several small caves have been formed in the sandstone as well. A couple of miles south of the park at Stop 10, we examined the Hinckley Flowing Spring that emanates from well-developed fractures in the sandstone.



*Terry Boerboom of the MN Geological Survey makes a point outside the site of a cave developed in the Hinckley Sandstone in Robinson Park*



*Well-preserved ripple marks on an exposed surface of the Hinckley Sandstone*

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## Midwest Ground Water Conference

With out-of-state travel budgets as limited as they are, we were unable to find anyone who attended the 48th Annual Midwest Ground Water Conference to provide a summary of the conference. Lucky for us, the Department of Homeland Security was on the ball, reporting in its *Information Analysis and Infrastructure Protection Daily Open Source Infrastructure Report*, that "Threats of the contamination and misuse of ground water, one of the most important natural resources, will be the focus of a three-day gathering at Western Michigan University. Experts from 13 states as far away as North Dakota, Nebraska and Kansas will converge ... to share ideas and discuss ground water problems"

Two papers from Minnesota were given: K. J. Sherper-Rohs, Calvin Alexander and Scott Alexander, *Hydrostratigraphy of the Mt. Simon Aquifer in the Greater Twin Cities Metropolitan Area* and Boris Shmagin and Roman Kanivetsky, *A Watershed Systems Approach to Mapping Ground Water Resources*. The 49th Annual Midwest Ground Water Conference will be held in Indiana in 2004, and the 50th anniversary conference will be held in 2005 in Champaign-Urbana, Illinois, the site of the first Midwest Ground Water Conference in 1956.

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### Field Trip, cont.

Although the flowing spring is near the surface, the water contains no tritium according to Scott Alexander, indicating little if any influence of surface (recent) water on flow of the spring. The pH of the water averages about 6.5 and is high in iron.

Stop 11 was near Askov at the Rocky Kroon farm. Mr. Kroon's feedlot is in an area of numerous sinkholes developed in the Hinckley Sandstone. His manure storage area is concrete-lined, and runoff is contained in a membrane-lined pit. Although this is a geologically sensitive area, this farmer has taken

reasonable precautions to help prevent pollutants from his feedlot operation from reaching ground water. For Stop 12, it was back to Precambrian geology at a trap rock quarry, also near Askov. The basalt that is quarried here is softer and more weathered than most of the basalt elsewhere in the county due to the close proximity of the Douglas Fault along the margin of the St. Croix Horst. The last stop before lunch was at an area known as Beaver Sinks. Here, sinkholes formed behind a beaver dam in an area where the glacial cover over the Hinckley Sandstone is thin. From here, it was on to Moose Lake State Park, our lunch

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## MGWA Thanks its Corporate Members

Our list of corporate members includes:

**Interpoll, Inc**

**Environmental Strategies Corp**

**Liesch Associates, Inc**

**Soil Engineering Testing**

**TestAmerica, Inc**

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stop, and a tour of a beautiful exhibit of Lake Superior agates on display at the park headquarters building, before boarding the buses for the trip back to the Twin Cities.

We would like to thank the organizers and all the presenters for a job well done. This year's field trip guidebook included a CD-ROM of the trip itself as well as an electronic copy of the Pine County Geologic Atlas — Part A produced by the Minnesota Geological Survey.

*Submitted by Tom Clark, MPCA; all photos by Tim Thurnblad, MPCA.*



Group picture taken at the last stop outside the interpretive center at Moose Lake State Park



## Last Issue's Question of the Quarter

The previous problem:

You are a studying a site that has three monitoring wells, and are told by the owner that one of the three wells is contaminated and the other two are clean. You select one of the three wells, say Well A, after which the owner informs you that Well C is clean and offers to let you change your selection. The question is, do you change your selection to Well B, and, if so, why? [Hint: The focus of this question is on probability, not geology or hydrogeology, so there is intentionally no information provided in that regard].

We received only one response to last month's question (so we know to stay focused on groundwater and away from probability in future questions of the quarter). Congratulations to Charlie T for the correct answer.

The problem presented above is based on the classic Monte Hall (former host of TV's Let's Make A Deal) problem. Monte shows you three doors and tells you that behind one is a spectacular prize and that behind the other two there are no prizes. He has you choose a door that you believe hides the prize, after which he opens one of the two remaining doors to show you it contains no prize. Then he offers you the opportunity to change your selection.

Question #1: Does it matter if you change your mind?

Question #2: What is the probability of winning if you stick with your original door?

Question #3: What is the probability of winning if you change your mind to the other unopened door?

Surprisingly, the answer to question #1 is yes, it does matter. Intuitively, one would believe one has a one in two chance of winning, but this is not the case. Charlie T sums it up well in his response: "I believe the classic answer is you are better off switching. Chances are 2/3 that you will NOT pick the correct option the first time. When given only two choices, [because the owner told you one well is clean] the owner must pick the wrong one, leaving you with a 2/3 chance if you switch your initial guess..." Keep in mind that these results reflect many trials (it's a probability problem after all).

Many web sites discuss the probabilistic basis for this, and some even allow you to run simulations of the situation and repeat them a hundred, a thousand, even ten thousand times. Check out the following:

<http://math.rice.edu/~hemphill/Professional/Presentations/MonteHall/Monte.html>

<http://www.cut-the-knot.org/hall.shtml>

or simply run a Google search on "Monte Hall Problem."

## DNR Water Appropriation Fees Increased

The fees required with annual water use reports were changed by the 2003 Legislature as part of the budget balancing efforts. Water use fees have not been increased since 1990 and the water appropriation fee increase will generate an estimated additional \$1.26 million per year.

The fee collected is directed to the state general fund and supports DNR's water management programs, including permit management, managing the observation well and surface water gaging networks, technical analysis, well interference issues, pumping tests and water resource studies. The fees apply to appropriators of more than 10,000 gallons of water per day or 1 million gallons per year and both surface water and ground water sources.

### Fee Schedule

Volume Appropriated (million gallons)	Fee (each permit) (each million gal.)
0 to 50	\$101 min. fee
50 to 100	\$3.00
100 to 150	\$3.50
150 to 200	\$4.00
200 to 250	\$4.50
250 to 300	\$5.00
300 to 350	\$5.50
350 to 400	\$6.00
400 to 450	\$6.50
450 to 500	\$7.00
Above 500	\$7.50

The new fees are payable for all water use in 2003 and must be paid with the annual report of water use that is due on February 15, 2004.

More information and appropriation permit application forms are available on the DNR Waters web site at [http://www.dnr.state.mn.us/waters/watermgmt\\_section/appropriations/permits.html](http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html), or e-mail water use permit questions to [wateruse@dnr.state.mn.us](mailto:wateruse@dnr.state.mn.us).

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## Question of the Quarter! ?

The Question of the Quarter is a new section in our newsletter. Each quarter a different question will be posed and all members are invited to offer their "two cents worth" Last quarter's question is discussed on page 7.

This quarter's question is:

The oldest ground water age measured in Minnesota is:

- a) Less than 100 years
- b) 100 – 1000 years
- c) 1000 – 10,000 years
- d) 10,000 to 100,000 years
- e) Really, really old

Email your answer and your "two cents worth" to:

[newsletter@mgwa.org](mailto:newsletter@mgwa.org)

## Update on Baytown Township Groundwater TCE Contamination Site

The Baytown Township Groundwater Contamination Site is located in central Washington County, Minnesota, extending from just west of Lake Elmo Airport eastward to the St. Croix River. The area of groundwater contamination is approximately 7 square miles, stretching in an elongated plume(s) from west to east, approximately 4½ miles long and up to two miles wide. The plume comprises parts of Baytown and West Lakeland townships and the cities of Bayport and Lake Elmo. The contaminant of primary concern is 1,2-Trichloroethylene (TCE). Carbon tetrachloride also appears in some wells. TCE contamination has been detected in wells completed in the glacial deposits, the

Prairie du Chien Dolomite, the Jordan Sandstone, and most recently in the Franconia Sandstone (see Figure 1). Groundwater flow, on a regional scale, is from west to east, discharging ultimately into the St. Croix River. TCE has historically been used in metal cleaning and degreasing and as a solvent.

The June 2002 issue of the Minnesota Groundwater Association newsletter included an update of various developments in the groundwater contamination problem impacting Baytown and West Lakeland Townships. Following the Minnesota Department of Health (MDH) issuance of an interim exposure limit of 5 micrograms/liter (ug/l) for TCE in January 2002, the scope and magnitude of the ground water contamination problem changed markedly as now a much larger area and number

of wells exceeded health standards. The Minnesota Pollution Control Agency (MPCA) and the Metropolitan Airports Commission (MAC) embarked on a major effort to sample approximately 320 private wells.

To date, 148 wells have exceeded the 5 ug/l MDH-recommended interim exposure limit for TCE and have been (or are scheduled to be) fitted with whole-house granular activated carbon (GAC) filter systems. MAC and the MPCA have committed to providing GAC filter systems to homes where the wells exceed 5 ug/l TCE for properties platted and approved before April 9, 2002. For properties platted after this date, the well owner is responsible for installing, maintaining, and monitoring the whole-house GAC filter system. Baytown Township passed ordinance Number 36 on September 8, 2003, requiring periodic testing of private wells and installation and replacement (every two years) of whole-house GAC filters (two filters in series) when TCE concentrations exceed 5 ug/l. West Lakeland Township is considering a similar ordinance. Typical costs for GAC filters are \$1300 for installation and \$300 for replacement. Filter replacement involves removing the first GAC filter tank, moving the second filter to the first position, and replacing the second filter with a new filter tank.

Since January 2002, the MDH Well Management Section has required all new wells to be cased and grouted through the St. Lawrence Formation and into the underlying Franconia Sandstone for wells located within or near the TCE plumes. The St. Lawrence Formation, which overlies the Franconia Sandstone, is a dolomitic siltstone and is a regional confining layer. MDH is attempting to ensure users obtain their water from a safe source rather than rely on treatment from a contaminated source. During 2002 and early 2003, 23 Franconia wells were installed in Baytown and West Lakeland townships. TCE was not detected in any of the wells.

In May 2003, two new wells were constructed in eastern Baytown Township and were completed in the

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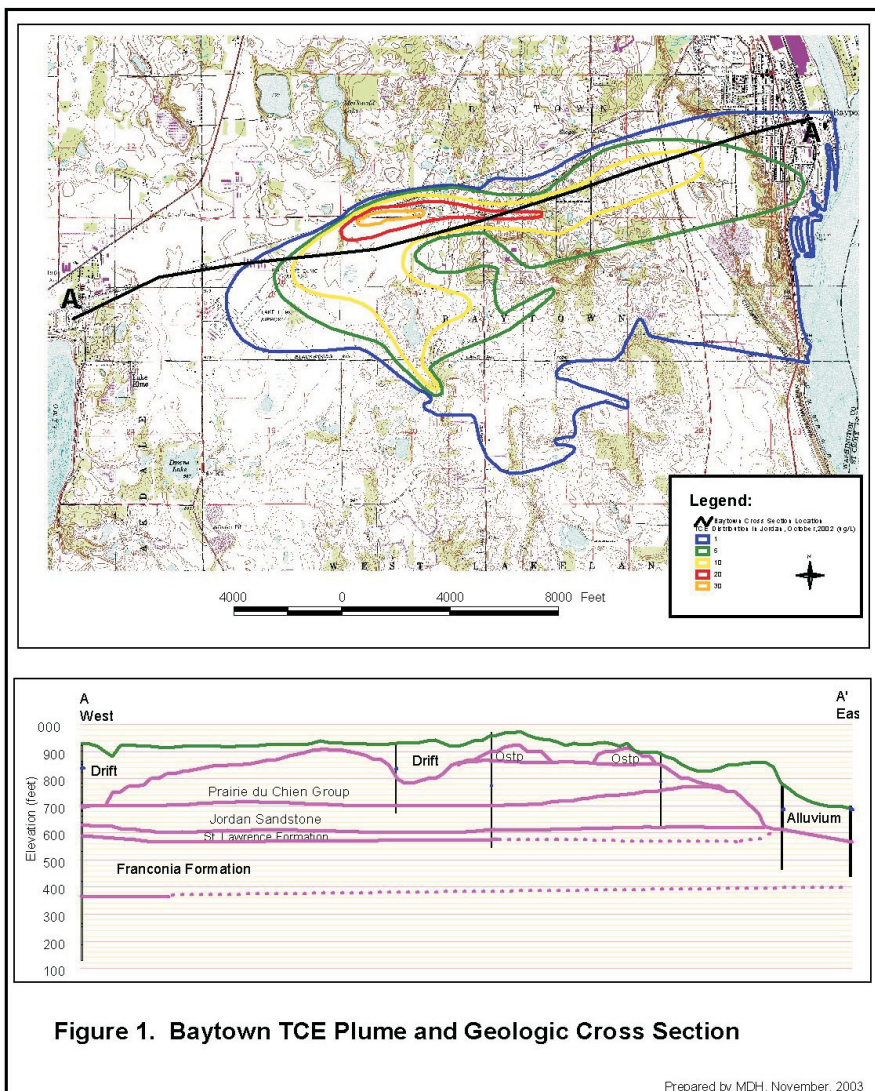


Figure 1. Baytown TCE Plume and Geologic Cross Section

Prepared by MDH, November, 2003

## Baytown, cont.

Franconia Sandstone aquifer. TCE was detected in both wells. Although these two wells were constructed through competent St. Lawrence Formation, it and the overlying bedrock formations are absent just east of these sites as one approaches the St. Croix Valley (see Figure 1). These findings sparked the resampling of all Franconia wells that had been constructed. TCE was detected in only one existing well, approximately ½ mile south of the initial detections. Since that time, TCE has been detected in two other newly-installed Franconia wells, in the same general area as the first positive Franconia wells. MDH has recently issued permission to construct several wells in the TCE plume within the Jordan Sandstone in the area where the Franconia Sandstone is contaminated. These wells must have whole-house GAC filters installed.

At the same time, sampling of Baytown municipal well #2, located in western Bayport, identified the presence of TCE for the first time, but below Maximum Contaminant Levels (MCL's). Bayport #2 is completed open-hole in the Franconia Sandstone, which is also the first bedrock at this location. Bayport #2 is approximately one mile northeast of the four new private wells showing TCE in the Franconia Sandstone.

There was initial concern that the finding of TCE in the Franconia Sandstone might have resulted from well construction practices. However, all of the wells were inspected at the time of installation. The wells were cased and grouted into the Franconia Sandstone. Since this area is near the "edge" of the major bedrock valley containing the St. Croix River, geologists suspected that fractures, faults, and/or erosional features may provide pathways for TCE to enter the Franconia Sandstone. Washington County is working with the Minnesota Geological Survey to design a study in Baytown and West Lakeland townships to investigate the extent of fracturing, faulting, and weathering features in the bedrock. A similar study just completed in southern Washington County identified extensive fracturing and faulting, with a

maximum step displacement of 75 feet in the Jordan Sandstone.

During 2003, the MPCA has been conducting further investigation of the portion of the TCE plume that extends approximately ½ mile north-west and upgradient of Lake Elmo Airport. The distribution of this plume suggests a contributing source west of Lake Elmo Airport, although multiple sources remain a strong possibility. MPCA is also investigating past businesses and practices within the City of Lake Elmo and allegations of past dumping in the area.

*Contributed by Mike Convery, PG, CPG, MDH, with help from other MDH and MPCA staff. To comment on this article, send email to [newsletter@mgwa.org](mailto:newsletter@mgwa.org)*

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## MGWA Fall 2003 Conference

### Water Conservation in Minnesota: Is it time to get serious?

The theme of this year's fall conference was water conservation and was timely given the current drought conditions, which are the worst since 1988. Nearly 200 people attended the conference on November 10, 2003, at the Earl Brown Conference Center on the St. Paul campus of the University of Minnesota. The conference included speakers from the nation's capital, the desert southwest, as well as from Minnesota,



Dr. Robert Glennon

which provided a variety of perspectives on this topic.

The morning keynote speaker, **Dr. Robert Glennon**, Professor of Law at the University of Arizona, presented *The Concept of Capture: Ground Water Use Can Impact Surface Water Resources*. Citing examples from his book *Water Follies, Groundwater Pumping and the Fate of America's Fresh Waters*, he illustrated the negative impact on surface water and vegetation by groundwater withdrawal in different parts of the country. The riparian law, common in the eastern United States, was compared with the prior appropriation laws prevalent in the western United States. Problems with water law for surface water and groundwater were then discussed. He concluded by offering possible solutions to the problems created by excessive groundwater withdrawal: accept water as both a public resource and private property; combine the command and control model of government rules and regulations with market forces of transferable rights and price incentives; restrict pumping and require conservation; facilitate water transfers from lower value to higher value uses; and finally, recognize the economic value of water resources by increasing water rates.

**ohn R. Wells** from the Minnesota Environmental Quality Board spoke on *Thoughts About the Future: Getting Serious by Getting Sustainable*. Sustainable development is thinking and acting as if the long-term future mattered, living within our means, and understanding and respecting limits. The Governor's vision includes keeping Minnesota's waters clean, ensuring that communities have safe water, and restoring the casualties of society's great progress. The Governor's Clean Water Initiative was discussed (see accompanying article in this newsletter on page 14). Applications of water management include understanding surface and groundwater connections, restoring ambient monitoring of wells, and maintaining the status quo of water quality. He advocated taking creative approaches and outlined elements needed in a sound groundwater program.

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## Fall Conference, cont.

**Sean Hunt** of DNR Waters, presented Minnesota Water Use and Water Conservation. He discussed Minnesota's water use permit program and the requirement for emergency and conservation plans of municipal water supplies. Categories of types of water use were listed as well as priorities for water allocation during periods of drought. New permits for once-through water use (over 5 million gallons per year) are prohibited and existing permits are being phased out. Prairie du Chien – Jordan observation wells in both Minneapolis and St. Paul started to show reduced summer drawdowns coincident with the reduction in water use for once-through cooling. He concluded that we can do better in our efforts at water conservation through industrial process cooling that relies less on once-through groundwater use, lawn watering systems that rely on moisture sensors, reduction in wasteful practices, and increased education.

**Chris Elvrum** of the Metropolitan Council discussed Water Supply and Planning in the Twin Cities Metro Area. He noted that 62% of municipal wells are in the Prairie du Chien - Jordan aquifer. The current residential per capita water demand averages about 76 gallons and is

expected to increase steadily over the next 40 years (it was 103 gallons during the drought in 1988). There are competing demands for groundwater including the importance of maintaining unique ecosystems such as the Savage Fen. He cited studies that show that increasing the area of impervious surfaces can reduce aquifer recharge. Conservation plans, including sprinkling restrictions, are in place in 82% of communities. He reviewed the efforts of subregional planning groups to study water supply issues in the metro area.

**Stephanie Tanner** of the National Renewable Energy Laboratory spoke on Water Efficiency in Federal Buildings. She reviewed types of buildings, water uses, and reasons for water efficiency. The federal government uses 300-450 million gallons of water per day and there is a high potential for water conservation. The role of technology development was discussed along with ten best management practices to reduce water use in buildings. Utilities can assist by working with facilities to help them understand their water usage, working with facilities to plan and meet local goals, reviewing rates and billing for accuracy, and providing technical assistance on options, including water as part of other service contracts. She reviewed case studies, including an effluent irrigation project and efforts to conserve water at the

National Zoo. She concluded that stormwater was the final utility frontier and listed conservation options such as green roofs, rain gardens and rainwater harvesting.

**Dr. Gordon Hess** of ARCADIS presented We'll Just Pump/Generate/Impound More Water, or How I Learned to Stop Worrying and Just Increase the Budget. He reviewed case studies where disastrous results could have been avoided with some forethought. These included a municipal well that had an increase in nitrate, and an irrigation project that used saline groundwater, and an industry that moved into a small city and increased its share of the municipal water supply. A proposed plan to increase pumping in a municipal well by 5% was canceled after a study revealed that 100-500 private supply wells would be impacted. A conservation plan was able to meet the needs of the city as an alternative to the proposed increase in pumping. "Thinking outside of the box" is occasionally necessary to evaluate the potential impacts of events of increasing water production. He advocated soliciting advice, developing contingency plans and evaluating the alternatives to just getting more water.

After lunch, **Chris Elvrum and Cathy Villas-Horns** of the Minnesota Department of Agriculture reviewed the proposal by the Science Museum of Minnesota to develop an outdoor Science Park (see page 16). The exhibit will include a working well as well as information about groundwater. Members of MGWA were encouraged to contribute money to the project.

The afternoon keynote speaker, **Katherine Yuhás**, Water Conservation Officer for the City of Albuquerque in New Mexico, presented Planning and Successful Implementation of Efficient Water Use Practices. A popular, local misconception is that the city sits over a lake with an inexhaustible supply of water for its residents. A study by the U.S. Bureau of Reclamation and the U.S. Geological Survey in 1985 revealed that only half of the water pumped for water supply is replenished in the aquifer. If the drawdown reached 250 feet, land

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*Chris Elvrum and Cathy Villas-Horns presented the Science Park proposal.*

## Fall Conference, cont.

subsidence was expected to result. The study has spurred legislation for the Ground Water Protection Initiative and water conservation efforts in the city. The city has an agreement to divert water from the Rio Grande



*Katherine Yuhas*

River, but the project has been stalled due to concerns about the impact on the Silvery Minnow, an endangered species. Three elements of an effective conservation program are education, enforcement, and incentives. Conservation practices adopted include rebate programs for the use of low flow toilets and xeriscaping (using native plants). The city assesses a fee of \$150 if water use exceeds 300% of average use of water in the city and \$200 if water use exceeds 400%. These conservation efforts have resulted in a reduction in overall water consumption of 30% within 10 years.

**Drew Anderson** of the City of Waconia spoke about Water Conservation Policy, Waconia Getting Serious. The population of Waconia is 8,900 but has 200 housing starts per year. To reduce water use, the city has imposed a ban on watering from 10 a.m. until 5 p.m. and does issue administrative citations to violators. The city has an increasing rate structure for water use. Lifestyle competition drives water use. Keeping up with the neighbors includes having a nice green lawn. He advocated education as an important tool

*MGWA Newsletter, December 2003*



*Karl DeWahl*

to encourage people to do their part for water conservation.

**Karl DeWahl** of the Minnesota Technical Assistance Program at the University of Minnesota presented Water Conservation in Minnesota Industrial Processes. He discussed the Minnesota Technical Assistance Program (MnTAP) and his efforts to promote water conservation in industrial processes. Specific examples of making modifications in industrial processes were given for reducing cooling water, reusing cooling water and reducing process water. In addition to reducing water consumption, these modifications have prevented



*Dr. L. Harvey Thorleifson, MGS Director*

pollution by reducing or eliminating wastes, emissions and releases.

**Dr. L. Harvey Thorleifson**, new director of the Minnesota Geological Survey, gave a fast paced presentation about the Role of Geological Mapping in Ground Water Management. Through the use of computer graphics, he showed how 3-D geological maps could be produced. The geology of the lake bottoms needs to be studied and mapped for the development of 3-D geological maps. Data tools are now available to produce more accurate maps of aquifer systems. Interactive 3-D models can show both spatial and temporal scales and can be used to study surface and groundwater interaction. Achieving sustainable use of groundwater is important in both quantity and quality. He concluded that we needed to take a long-term perspective on water quality, because once groundwater is contaminated, it may be impossible to clean up.

**Paul Christiansen** of PeopleService, Inc., was the final speaker and spoke about Security at Public Facilities — Wellhead Protection in its Purest Form. He discussed a break-in in a well house in the small city of Braham, Minnesota, a typical small town, which is proud of its pies. The city had no reason to suspect it would be a target for what some might interpret as terrorism-like acts. The water was tested and the residents were notified that it was safe to drink. As a result of the break-in, the city has taken a number of security measures, such as installing an alarm system and strobe light, replacing padlocks, and shielding the legs of the water tower so that the ladder to the top cannot be accessed. The cost of these measures was relatively low and preferable to the cost of water analysis and media publicity associated with another break-in. He recommended security precautions such as asking the police department to include a water facility as part of routine checks, installing outdoor lighting, and using deadbolt locks.

*Submitted by Norm Mofjeld, MDH, and MGWA Newsletter Editor.*

*To comment on this article, send e-mail to: [newsletter@mgwa.org](mailto:newsletter@mgwa.org)*

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## Pawlenty Administration's Clean Water Initiative

Governor Tim Pawlenty's administration will be undertaking aggressive demonstration projects in four key areas of the state over the next two years: the Red River Valley, central Minnesota lakes, southeastern Minnesota and the Twin Cities metro area. As a part of this effort, a new Conservation Reserve and Enhancement Program (CREP) has been announced to allow agricultural land in critical watersheds to be taken out of production to prevent harmful runoff and further pollution of rivers and streams. In an October 7, 2003 editorial to the St. Paul Pioneer Press defending his Clean Water Initiative, Pawlenty called water Minnesota's most valuable natural resource, not only in terms of generating tourist dollars, but also in making Minnesota's quality of life second to none. He cited our over 14,000 lakes, 92,000 river miles, 10.6 million acres of wetlands, and a trillion gallons of ground water as worthy of protection.

— Submitted by Tom Clark

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## BAELN focuses on the Central Lakes Minnesota Water Initiative

The Brainerd Area Environmental Learning Network (BAELN) hosted a presentation and networking opportunity at the Minnesota Pollution Control Agency's (MPCA) Brainerd office on November 13. Tim Scherkenbach, liaison from the MPCA to the Governor's office on the new Minnesota Water Initiative, answered questions about the water initiative plans for the Central Lakes area.

This was the first event for the newly formed BAELN. The Network consists of staff and members of the MPCA, Minnesota Office of Environmental Assistance, 1000 Friends of Minnesota, Minnesota Department of Natural Resources, the Northland Arboretum, Crow Wing Soil and Water Conservation District, the Paul Bunyan Trail Committee, Central Lakes College, the Initiative Foundation and U of M Extension Service. BAELN was formed to create

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## Corporate Membership Rates

Membership Levels	Annual Package Cost	Annual per Item Cost	Annual Savings	Percent Savings
Basic Level	\$350	\$369	\$19	5%
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Industry Leader	\$735	\$886	\$151	20%
Corporate Sponsor	\$1530	\$1986	\$456	30%

### Corporate Membership Features:

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- Standard Level: Quarter page ad in newsletter and directory, "Lobby Copy" of membership directory, web page sidebar, Certificate of Membership, and up to 9 employee memberships
- Industry Leader: Half page ad in newsletter and directory, "Lobby Copy" of membership directory, web page sidebar, Certificate of Membership, and up to 14 employee memberships
- Corporate Sponsor: Full sponsor acknowledgement in MGWA conference publications, full page ad in newsletter and directory, "Lobby Copy" of membership directory, Certificate of Membership, web page sidebar and up to 20 employee memberships

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opportunities for people working in the environmental field, and the community, to receive timely information on environmental and sustainability issues, along with the chance to network with other professionals.

BAELN plans to host up to ten events per year on a variety of topics like air and water quality, lakescaping, waste reduction, smart growth, permitting, green building, rain gardens, and cluster developments, just to name a few.

For more information on the BAELN please contact Stephen Mikkelsen, Information Officer, MPCA-Brainerd at (218) 855-5001, or toll free at 1-800-657-3864.

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## MGWA Newsletter to be Scanned

The MGWA newsletter has been published for the past 22 years. A complete set of all issues was collected by former Editor in Chief Tom Clark.

To our knowledge this collection is the only complete set in existence. There is a need to archive these issues in a useable format. The MGWA Newsletter team has recommended to the MGWA Board that the old issues be scanned and saved and that a bibliography be prepared.

The Board asked WRI to provide, and subsequently approved, a proposal by WRI to provide this product using an enhanced PDF format, which will make the text searchable. The cost of the project will be \$4400.

— Submitted by Norm Moffeld

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## New Publications of the US Geological Survey

Effective with the July-September 2003 issue, the U.S. Geological Survey will no longer print and distribute the quarterly version of "New Publications of the U.S. Geological Survey." The information will be released online through the USGS website at <http://pubs.usgs.gov/publications/>.

## Students Learn by Doing at Annual Water Festival

Over 1500 metropolitan area fifth graders attended the sixth annual Metro Children's Water Festival on September 24th at the State Fairgrounds. It was a sunny, breezy day for "students and presenters to get their 'hands' wet" learning about stewardship of our valuable ground and surface water resources in Minnesota, as the accompanying pictures show. As in previous years, the MGWA was proud to be one of the co-sponsors of the event, as the MGWA Foundation responded with a \$750 donation. Thanks to all who worked hard to make this year's Festival a success, and especially to the MGWA members who donated their time and talent to making it a great day.

The Metro Children's Water Festival website is found at <http://www.co.carver.mn.us/EnviroServices/CWF/>

*Submitted by Tom Clark, MPCA. These photos were taken by Tim Thurnblad, a Senior Hydrologist with the Minnesota Pollution Control Agency.*



*Bill Thompson of the MPCA's Rochester Office uses a stream table to show how objects in the stream bed affect flow*



*Karen Kill, Washington SWCD, demonstrates a ground water flow model*



*Eric Mohring, BWSR, handles duties at the popular Fish Printing station*



*Learning Landscape Model shows ground water impacts of surface activities at the EcoEducation learning station*

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## MGWA is working hard to get ground water into the Science Museum.

You may have heard about MGWA's efforts to get a ground water exhibit in the Science Museum's new Science Park. There have been articles in previous newsletters and solicitations for donations via the MGWA email list and an insert with the recent dues billing. We are working hard to plan the display and gather the funds necessary to build it. The exact design is still being worked out and will depend on the amount of money that is available. At a minimum, a bedrock well will be drilled, cores will be displayed and graphic panels will provide information about the well and ground water in general. The well will be adjacent to the centerpiece of Science Park, a nine-hole mini golf course which includes a waterfall and a braided stream and which will demonstrate landscape processes.

Several firms and members have made generous donations. Thank you very much! There is a good possibility that a local non-profit environmental organization may make a substantial donation so that the proposed design can be expanded. However, additional funds are still needed, especially since the likelihood of our success in raising outside funding is linked to the support we can show from our own members and donors. **Donations are tax deductible** because the Foundation is a 501(c)(3) nonprofit. An acknowledgement panel in Science Park will mention all those who donate over \$100. Checks can be made out to MGWA-Foundation and sent to the MGWA, c/o WRI, 4779 126th St. N, White Bear Lake, MN 55110-5910. For more information on the project or on how to donate, contact

Cathy Villas-Horns  
[cathy.villas-horns@state.mn.us](mailto:cathy.villas-horns@state.mn.us)  
(651) 297-5293

or Chris Elvrum  
[christohper.elvrum@metc.state.mn.us](mailto:christohper.elvrum@metc.state.mn.us) (651) 602-1066.

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## A Minnesota Ground Water Directory Updated

A *Minnesota Ground Water Directory* has been updated. Published by the Minnesota Pollution Control Agency, the *Directory* includes information about numerous organizations with Minnesota ground-water responsibilities or services. It is available at the following web site addresses:

<http://www.moea.state.mn.us/sc/resources.cfm>

[http://www.moea.state.mn.us/sc/resources/GroundWater\\_Directory.pdf](http://www.moea.state.mn.us/sc/resources/GroundWater_Directory.pdf)

For more information about the *Directory* or the more comprehensive *Minnesota Ground-Water Information Resources Guide*, available through the following web sites

<http://www.mgwa.org/gwguide.html>  
or

<http://www.geo.umn.edu/mgs/gwig/gwguide.html>

contact Tim Thurnblad, MPCA, (651) 296-8582,  
[tim.thurnblad@state.mn.us](mailto:tim.thurnblad@state.mn.us).

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## Source Water Assessments are Available Online

Source Water Assessments prepared by the Minnesota Department of Health are now available online for all of Minnesota's public water systems. An assessment provides a concise description of the water source – such as a well, lake, or river – used by a public water system and discusses how susceptible that source may be to contamination. The types of facilities for which assessments have been produced range from small businesses on their own well to large city water systems. Assessments can be located either by county or name of the facility.

*The assessments and additional information are available at:*

<http://www.health.state.mn.us/divs/eh/water/swp/swa/index.htm>

— submitted by Steve Robertson

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## MPCA's Air, Water and Waste Conference, February 24-26, 2004

The Minnesota Pollution Control Agency will host its annual Air, Water and Waste Conference at the Radisson Hotel South, Highway 100 and I-494 in Bloomington, February 24-26, 2004. The conference is designed to appeal to a broad audience and will tackle cutting edge issues including media-specific topics, new legislation, and emerging environmental concerns. This year, the Water Track includes seven sessions covering a broad range of issues impacting both ground water and surface water:

- The Economic and Societal Value of Clean Water
- Empower Yourself to Help Your Watershed
- Total Maximum Daily Loads (TMDLs): Perspectives from the Business and Regulatory Communities
- Ensuring Safe and Abundant Drinking Water for Minnesota
- Stormwater: Composting for Erosion Control
- Beach Monitoring Programs: Wave of the Future?
- Water Conservation and Wastewater Reduction Success Stories

In addition to the technical presentations, about 80 exhibitors from the public and private sectors will showcase their environmental products and services in one of the largest such exhibits in Minnesota. The conference is designed to meet continuing education requirements of various professional certification and licensing programs. For details, visit: <http://www.pca.state.mn.us/news/training/mawwconference/index.html>

— submitted by Tom Clark





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## MPCA Environmental Bulletin Series

The Minnesota Pollution Control Agency's Environmental Bulletin Series is designed to highlight environmental outcomes and results of scientific studies the MPCA and its partners conduct in air, water and waste management.

Each issue of the bulletin contains an abstract, a description of the study's methods, results, conclusions and references. The first in the series to be published gives results of a study of personal exposure to airborne fine particles in the Twin Cities area. The next bulletin to be produced will highlight results of a study to look at the effects of development along the North Shore of Lake Superior on area streams. Further information about the Environmental Bulletin Series can be found on the MPCA Web site at: <http://www.pca.state.mn.us/publications/environmentalbulletin/index.html>

— submitted by Tom Clark

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## New Book on Water Well Cleaning, Disinfection & Decontamination

Written by the National Ground Water Association 2001-2002 McElhiney Distinguished Lecturer, *Chemical Cleaning, Disinfection & Decontamination of Water Wells* (2003), by John H. Schnieders, Johnson Screens, details how microorganisms and minerals can inhabit and accumulate in water wells, along with the most effective cleaning methods to use. Sections include the biology and mineralogy of wells, geological considerations, laboratory testing, the chemistry of well cleaning, and disinfection chemistry. The book is available from the NGWA online bookstore at [www.ngwa.com](http://www.ngwa.com).

*Editor's Note: John Schnieders was the keynote speaker at the 2002 MGWA spring conference on effective drilling held at Johnson Screens.*

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## MGWA Board Meeting Minutes

**September 4, 2003**

**Place:** Black Bear Crossings in St. Paul, Minnesota

**Attending:** Marty Bonnell, President; Chris Elvrum, President Elect; Eric Hansen, Treasurer; Jon Pollock, Secretary; Jennie Leete, WRI; Sean Hunt, WRI; Norm Mofjeld, Newsletter Editor; Gordie Hess, Foundation;

**Approval of Minutes:** The Board approved minutes for the Regular Board Meeting held on August 6, 2003.

**Treasurer's Report:** \$26718.00 on hand. \$5,000.00 moved from checking account to money market account. May move another \$5,000.00 from checking to money market.

**Membership:** Leisch Associates renewed their corporate membership.

**Web Page:** Directory is out. Science Museum Project Request for funding sent to membership. Field trip web page is online. About 1/3 of registrations are completed online.

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## Join the Minnesota Ground Water Association!

Annual dues are currently \$25 for professional members and \$15 for students. Members are entitled to subscribe to the paper version of the newsletter for \$10/yr, the electronic version is available on the website for members at no additional charge. Members are also entitled to purchase a paper copy of the annual membership directory for \$7; an electronic version is available on the website for paid members at no additional charge. Additional donations to the MGWA Foundation will be gratefully accepted. Dues paid to MGWA are **not** deductible as charitable contributions for federal income tax purposes. However, dues payments are deductible as ordinary and necessary business expenses to the extent allowed by law. The MGWA Foundation is a 501(c)3 non-profit and donations to it **are** deductible as charitable contributions.

Just complete the form below and mail to: MGWA, c/o WRI, 4779 126th St. N, White Bear Lake, MN 55110-5910.

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Name \_\_\_\_\_ Full-Time Student? \_\_\_\_\_

Affiliation/Employer \_\_\_\_\_

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Work Telephone Number \_\_\_\_\_ E-mail \_\_\_\_\_

Fax Number \_\_\_\_\_

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Which Telephone Number should we use for Directory Listing? \_\_\_\_\_

Please indicate if you want to have the Directory (\$7) \_\_\_\_\_ or Newsletter (\$10) mailed to you \_\_\_\_\_

**Foundation:** Gordie has list of Minnesota Elementary Science Teachers and has been sending out information on the availability of Foundation money for classroom type activities. About six responses have been received most requesting additional information.

**Newsletter:** WRI submitted proposal for scanning back issues of the newsletter as requested. Includes provisions for bibliography, scanning past issues, and enhanced PDF of scanned images including OCR text, bookmarks, and searching across the entire archive via Adobe Acrobat PDX index. The cost of the proposal is \$4,400.00. Motion approved by Board to accept WRI's proposal to convert all past newsletters to enhanced PDF and create a corresponding bibliography.

**Old Business**

Education Committee has been receiving money/pledges for Science Museum Project. A meeting will be held September 12 on Harriet Island to distribute names of potential donors to those making calls.

Fall Conference: Next meeting will be Thursday September 11, 2003. Need two more speakers.

Fall Field Trip: About 60 people signed up, may require two buses.



**October 2, 2003**

**Place:** Como Pavilion, Black Bear Crossing, St. Paul, Minnesota

**Attending:** Marty Bonnell, President; Chris Elvrum, President Elect; Eric Hansen, Treasurer; Jon Pollock, Secretary; Gordie Hess, Foundation.

**Approval of Minutes:** The Board approved minutes for the Regular Board Meeting held on September 4, 2003.

**Treasurer's Report:** Should be in good shape from the field trip, but will have a better idea next month when expenses are in.

— Continued on Page 22

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Business Card	3.5 x 2.3	\$66	\$50
Quarter Page	3.5 x 4.8	\$121	\$99
Half Page	7.5 x 4.8	\$225	\$190
Full Page	7.5 x 9.75	\$425	\$360
Inside Cover	7.5 x 9.75	not available	\$395

**Classified ads:** Classified ads in the newsletter are charged at the rate of \$3 per 45 characters (including spaces and punctuation) per newsletter issue.

**E-mail notices:** A one-time e-mailing to the membership costs \$10 for an individual (e.g., seeking a job), and \$50 for an organization (e.g., announcing a new product, job opening etc.). A 200 word limit is imposed. The advantage of e-mail is the speed of dissemination.

The Advertising Manager has final determination on the acceptance of materials submitted. There are no commissions on ads. Copy must be received by the publication deadlines: 6 February, 7 May, 8 August, or 5 November. Advertisers should submit their material as a digital file in TIFF, JPEG or PCX format at 300 to 600 dpi. A set-up charge will be applied to non-digital ad material.

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## Letter to the MGWA Foundation

October 13, 2003

Dear MGWA Foundation,

We the members of the Spring 2003 University of Wisconsin River Falls Geology 377 Northeast Regional Geology Field Trip wish to express our tremendous appreciation for your support of our education. The monetary contribution that you made to help us offset our field trip costs is greatly appreciated.

With new travel requirements related to liability and insurance field trips now cost more than in years prior. Your support of this experience really helped to keep expenses in line. Beyond your support we did do fundraisers, the Department provided monetary support and students paid the largest portion of the trip costs. We used our funds wisely, camping and cooking out most of the way.

Our trip took us through Ontario, New York and Massachusetts on our way to and from our focus area of Maine, New Brunswick and Quebec. We saw a wide range of geology in classic sedimentary, igneous and metamorphic terrains. In addition, we experienced a fair bit of process coastal geomorphology and hydrology with some very interesting hydrogeologic features.

It was a very interesting, educational and enjoyable two week excursion. We sincerely appreciate your contribution to this trip. Thank you.

Sincerely, Dr. Kerry L. Keen, Assistant Professor and Jay Gilbertson, UWRF alumnus.

*The letter was also signed by a posse of students.*

*Sand Beach, Acadia National Park, Maine — bottom right*

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## ILSG 2004

50th Annual Institute on Lake Superior Geology, Duluth, May 4-9, 2004. Focus of conference is Precambrian and Quaternary geology of the Lake Superior Region. Two days of technical sessions and eight field trips.



*Copper Mine, Murdochville, Quebec, June 2003*



*Field Trip Group at Forillon National Park, Quebec, June 2003*





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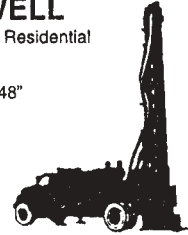
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## Board Minutes, cont.

**Foundation:** Gordie has received a list from Deep Portage requesting information. Waiting for Science Park Request from Science Park Committee.

**Newsletter:** September Newsletter went out. Working on December issue.

### Old Business

**Fall Conference:** Gordie will speak at conference. Marty will try to get someone from MNTAP.

**Fall Field Trip:** 93 people signed up compared with 13 last year. Excellent planning by AIPG. Entire trip is on CD. National AIPG will be here in 2006. AIPG will probably be interested in hosting the trip in 2006.

### New Business

**Meeting Location:** Marty will search for new location for future Board Meetings. Black Bear Crossing's only current location, at the Como Pavillion, does not open early enough for our meeting.

**New Officers:** Upcoming election will be for Secretary and President Elect.

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## Bridging the Past, Present and the Future

The Red River Basin Commission announces the **21st Annual Red River Basin Land and Water International Summit Conference** to be held **January 14-16, 2004** at the **Courtyard Marriot Moorhead Area Conference Center**. The theme of the conference is "**Watershed Issues: Bridging the Past, Present and the Future.**"

Cheryl Corrigan, MPCA Commissioner will give the Keynote on *Watershed Approach*.

The "Past" will be addressed in talks on *Tree Rings and Past Red River Floods* and *Steamboats on the Red*.

The "Present" will be addressed in talks on *Red River Valley Water Supply*, "US Water Supply Needs, several sessions giving the current information about the Devils Lake Outlet, panel discussions of upper basin

agricultural land issues, flood damage reduction activities, and invasive species problems.

The "Future" will be addressed in talks about Homeland Security, Geomorphic Change along the Red River, and the Lake Winnipeg Action Plan, among many others.

Detailed information about the conference is available at:

[http://www.redriverbasincommission.org/Annual\\_Conference/annual\\_conference.html](http://www.redriverbasincommission.org/Annual_Conference/annual_conference.html)



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## Minnesota Rural Water Association 2004 Annual Technical Conference

The 20th Annual Technical Conference is scheduled for March 2-4, 2004 at the Civic Center in St. Cloud. Training sessional will include tracks in Water O&M, Waterwater O&M, Source Water, Ground Water Well-head Protection and much more. Over 1200 are expected to be in attendance.

Details are available at:  
[www.mrwa.com](http://www.mrwa.com)

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## Donations to Ground Water Exhibit at Science Park, Science Museum of Minnesota

We are very grateful to the following individuals and companies for these donations (received as of 12/9/2003)

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MGWA Newsletter, December 2003

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