Minnesota Ground Water Association

www.mgwa.org

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Cave Re-Discovered at Decorah Edge in Rochester

Submitted by Terry Lee, Olmsted County

In April of this year, a cave whose entrance had been sealed and buried in the late-1950s was reopened as part of a site investigation in anticipation of plat development. Being closed for the last 50 years has protected the cave from vandalism and preserved many of its natural and historic features. Jeff Green from the Minnesota Department of Natural Resources describes the 150-foot long cave as the most richly decorated St. Peter Sandstone cave that he has seen. He notes that the cave contains many speleothems (rimstone dams, flowstone, stalactites and soda straws). Kathy Stevenson and Ernie Boszhardt, archeologists at the University of Wisconsin, La Crosse, have identified what they believe are Native American symbols carved into the sandstone walls of the cave.

The cave is located in a focused groundwater recharge area known as the Decorah Edge. In this setting groundwater from the Upper Carbonate aquifer spills over the terminal edge of the Decorah shale and recharges the underlying St. Peter-Prairie du Chien aquifer. A US Geological Survey Decorah Edge research site is immediately southeast of the cave. There is an effort underway to preserve the cave for its geological and archeological value and future research. The owner is working with local and state geologists and naturalists to determine the best way to preserve the features of the cave and to provide access to the cave.

At left, the cave entrance, (photo: Olmsted County) below left, University of Wisconsin- La Crosse archeologist Katherine Stevenson points out some of the drawings and graffiti on the wall of Hadley Valley cave during a tour with archaeologists and area planners in June. Below, landowner Don Layton lends a hand to Nancy Slocumb as they climb out of the Hadley Valley cave. (Ken Klotzbach/ Rochester Post-Bulletin)

— more photos on page 3

President's Letter

We've had some good news regarding the Science Museum of Minnesota (SMM) Science Park Ground Water exhibit. The Legislative Commission on Minnesota Resources (LCMR) recommended funding for the proposal to develop the ground water display in the Outdoor Science Park. Through your generous support the MGWA has already raised enough money to drill the well and now with the funds from the LCMR a really cool display can be built around it. Of course the Legislature has the final say during the 2005 session on allocation of funds but it looks promising. Thanks and congratulations to Pat Hamilton of the SMM, Cathy Villas-Horns of the Minnesota Department of Agriculture, Gil Gabanski of GJG Environmental Consultants and Mark Ferrey of the Minnesota Pollution Control Agency for their work on the proposal and project. They will continue working together to develop a scientifically sound and entertaining display.

If you read my Spring President's column, I mentioned that we might be talking about the impact of heavy withdrawals on aquifers if the period of low rainfall continued. I think it was

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2004 Newsletter Deadlines

Issue	To Editor
December	11/05/2004

President's Letter, cont.

raining the day I wrote that and it rained the next 60 days. We managed to get through the summer without a significant dry/high demand period in the metropolitan area. That hasn't stopped some of us in our field from considering the long term sustainability of the resource. The Metropolitan Council has recently started a Northwest Metro Water Supply Work Group (NMWSWG) to address the need for water to supply the significant projected growth in the I-94 corridor where the Prairie du Chien- Jordan aquifer is absent. We have had 3 meetings attended by several communities, counties, state agencies and private parties with an interest in the issue. It is modeled after the Southwest Metro Ground Water Work Group which has been meeting since 1997 to address water supply in the Savage/Shakopee/Burnsville/Lakeville/Prior Lake area. The NMWSWG is part of the Governor's Clean Water Initiative – Twin Cities Core Pilot Project which is meant to address water supply in the Twin Cities to St. Cloud corridor. As part of this project, the Council is using the Metro Model to evaluate the aquifer capacity in the northwest metro area (see the article on this topic in this newsletter). We hope to address potential problems in the Northwest Metro instead of reacting to them. On a disappointing note, another aspect of that pilot project, a study of drift aquifers and surface waters in the corridor, was not recommended for funding by the LCMR. However, the steering committee continues to explore funding options for that project.

As President of the MGWA during a US Presidential election year I am going to take this opportunity to say something about the upcoming elections. It is my only chance to reach the 4-5 people who might continue reading. Carl Sagan once said "Anything else you're interested in is not going to happen if you can't breathe the air and drink the water. Don't sit this one out. Do something. You are by accident of fate alive at an absolutely critical moment in the history of our planet." Environmental issues are not the only issues at a critical point in history. I realize that we have a diverse membership and would not try to persuade you to choose one way or the other in the election in this column. What I would like to do is encourage you to be informed and put some serious thought into your choice and then go out and vote. A friend of mine once said that he doesn't vote because it doesn't make a difference. We found out four years ago that a few votes can make a difference. I do, however, encourage that particular friend to continue not voting considering his likely choice.

This Fall brings the MGWA elections. Nominate someone, yourself if you'd like. The more people who are active and willing to help out the better off the MGWA is and it's kind of fun.

We've got a great Fall field trip lined up with the Wisconsin Ground Water Association and Wisconsin Chapter of the American Institute of Professional Geologists (AIPG) in September and Fall conference in November. In addition, the Minnesota Chapter of the AIPG is having a field trip in Northwestern Minnesota, so there are lots of opportunities to get out, talk ground water and see some rocks. There is more information on all of these in this newsletter. Hope to see you this fall!

— Chris Elvrum, MGWA President

WGWA Fall Field Trip

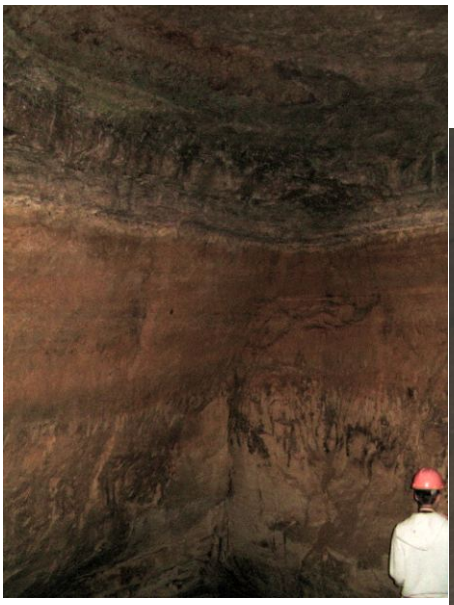
Mark your calendars for a very exciting fall field trip to western Wisconsin and southeast Minnesota! There is so much to see that one day would not do justice to the region, so the trip will be Friday September 24 and Saturday September 25. The area is a treasure trove of geological features. The Wisconsin Ground Water Association and American Institute of Professional Geologists (Wisconsin chapter) are combining forces to make this trip happen! The MGWA is coordinating the Minnesota stops. We have a star-studded cast of characters who will be leading various stops—Calvin Alexander, Jeanette Leete, Bruce Brown, Jim Knox, Terry Lee, and Lee Trotta—just to name some! We will start early on Friday out of Winona and meander through Minnesota and include stops along the mighty Mississippi River, seeps, a calcareous fen, an outcrop or two, and Mystery Cave. Overnight accommodations will be back in Winona. Saturday we will tour Wisconsin and include stops of fossil hunting (trilobites among others), aquitards, floodplain terraces, and sinkholes. Friends, spouses, and children old enough to enjoy the field trip are welcome. Details are found at www.wgwa.org/fieldtrip.html.

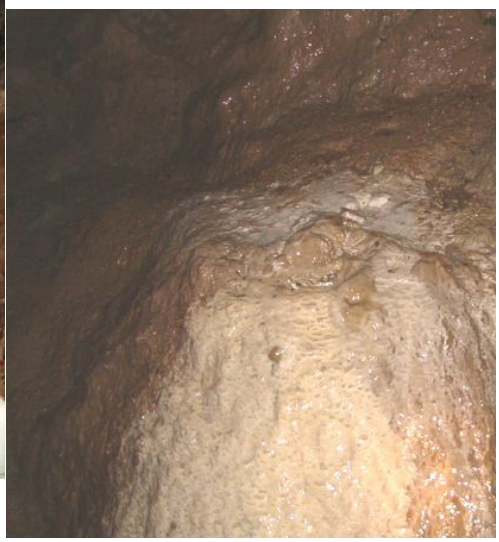
Minnesota AIPG Fall Field Trip — September 24 & 25

This trip will feature Dr. James Cotter, one of the most popular professors at the University Minnesota-Morris. The first stop is on the Herman beach - the highest lake level, and then we transect westward to Wheaton and on to the Cottonwood slough, the initial southern outlet of Glacial Lake Agassiz. The trip then moves to the Coteau des Prairie, south to Browns Valley and the Traverse Gap. Day 2 starts with classic glacial landforms near Starbuck, Glenwood and Brooten. No geology trip to western Minnesota would be complete without a stop at Kensington to look at the homestead of the historic runestone.

More details at www.aipgmn.org

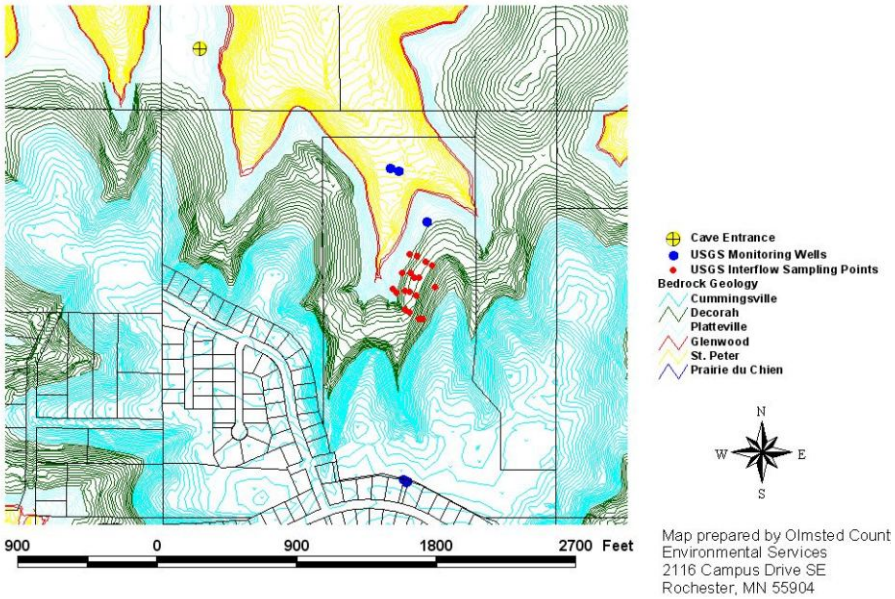
Cave Graphics, cont.





Cave walls, left, and cave floor below are in very good condition. Photos: Olmsted County.

Bedrock Geology, Monitoring Sites and Reopened Cave



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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.

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? 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

Member News

Jim Lundy moves to Minnesota Department of Health.

Jim Lundy has taken a hydrogeologist position at the Minnesota Department of Health (MDH) in the Source Water Protection program. Previously, Jim spent 16 years as a hydrogeologist at the Minnesota Pollution Control Agency, working on ground water problems related to remediation sites (leaking underground storage tanks, superfund), remediation policy, feedlots and impaired waters. His new position at MDH will involve mapping drinking water sensitivity to nitrate and arsenic at the county scale. Jim is also a scoutmaster for Troop 150, Roseville. The photo shows Jim leading them in search of the geology merit badge. They are measuring water levels in monitoring wells at 7 Mile Creek park. From left is Adam, Sean (Jim's son), Nick, scoutmaster Jim, Mitchell and Dylan. A monitoring well is behind the person on the left.

Tom Reppe joins the USGS.

In June 2004, Tom Reppe started in a position as a Hydrologist with the U.S. Geological Survey, Water Resources Discipline, in the Minnesota District Office. As a Hydrologist within the District, his role is to be project chief on various Minnesota-based projects, providing leadership through field, management, and technical support. Project data and information collected and interpreted

by USGS personnel is provided to Federal, State, and Local resource managers and planners, which they can use to make informed water-management decisions. Important water-management issues currently being investigated by the District include: the effects of land-use and land practices on water quality; the impact of increased urban development on aquifer recharge; the effects of ground-water pumping on surface-water levels, streamflow, and water quality; concentration trends in mercury-contaminated surface waters; nitrate contamination in ground water and surface water; the ability of wetlands to store water and/or reduce flooding; and the impact of vegetation uptake and microbial action on water quality.

Peter Whelan, geology professor at Morris, dies unexpectedly.

Early in the morning of Saturday, April 17, University of Minnesota, Morris Professor of Geology Peter Michael Whelan suddenly died due to a stroke-related brain hemorrhage at Abbott Northwestern Hospital in Minneapolis. Professor Whelan started teaching at the University of Minnesota, Morris in 1983. He received his PhD from California where his main focus was on igneous petrology. Before teaching at Morris, Whelan taught in the University of Wisconsin system. At Morris he taught a course on petrology and a course on caves, caverns, and karst. Peter's family includes a brother and cousins in Washington State where he grew up, and a wife (Diane) and daughter (Serena), who live in Morris. Additional information about Peter Whelan's life, his memorial service, and plans to install a large rock on the Morris campus in his memory can be found at the following links:

http://www.mrs.umn.edu/register/article.php?volume=16&issue=25&section=news&index=0
http://www.mrs.umn.edu/academic/science/news/geol.html
http://www.mrs.umn.edu/academic/science/news/peterobit.html

Fletcher Driscoll sails!

A recent (Aug 4, 2004) article in the White Bear Press highlighted MGWA member Fletcher Driscoll's love of sailing and recent boat refurbishing projects. His recent projects have involved refurbishing three 38-foot Class A scows and organizing races with them on White Bear Lake. We caught up with him soon after his return from racing in the National A-scow Championship Regatta, which was held on Lake Winnebago in Wisconsin.

He writes that he has "assembled a fleet of three boats: a 1963 Johnson (the last A boat built by Johnson here in White Bear in 1963, and still in good shape and quite competitive), a 1995 fiberglass Melges equipped with the most up-to-date swept-back rig, and a 2000 Melges with only one racing season on it prior to the current season." The racing schedule established this year through the White Bear Yacht Club uses these boats and has attracted much attention, largely because of how fast the boats are and the large, eye-catching spinnakers that the boats feature.

Fletcher has a particular interest in using the thrill of racing the A-scow to motivate youngsters to continue pursing sailing after learning to sail small one and two-person craft through programs offered by the White Bear Yacht Club. He sees sailing as a marvelous way of building self-confidence in teenagers and is one of the sporting activities in which boys and girls compete against one another on equal terms.

Read the article in the White Bear Press here: http://www.whitebearpress.com/main.asp?SectionID=8&SubSectionID=9&ArticleID=1398

Contributions encouraged! Member News is your section.

"Nailing" Arsenic-Tainted Water

At recent joint meeting of the American and Canadian Geophysical Unions in Montreal, field tests in Nepal were reported that suggest that people who live in areas with arsenic-tainted aquifers may be able to purify their drinking water by passing it through a low-cost, low-tech filter with a simple active ingredient—a few handfuls of iron nails.

Susan Murcott of the Massachusetts Institute of Technology reported that in the Terai region of southern Nepal, about 90 percent of the residents get their drinking water from wells and that more than 500,000 of the region's inhabitants consume water with arsenic concentrations that exceed 10 micrograms per liter.

The two-stage filter is made of concrete molded around a simple rectangular form. Water poured into the top of the filter passes through a tray that contains a few kilograms of iron nails—whose chemical action scours the arsenic from the fluid—and then collects in a sand-filled bottom compartment. When the water is drawn out of the sand, sediment particles and many microbes are left behind. Data gathered during field tests of 250 such filters indicate that they remove more than 96 percent of the arsenic from tainted water when flow rates don't exceed 30 liters of water per hour. These simple devices can even be made using large plastic garbage cans.

Excerpted from Science News, Vol. 165, No. 23, June 5, 2004, p. 366.

Reference:

Murcott, S., et al. 2004. Implementation of the arsenic biosand filter in Nepal. Joint Assembly of the American and Canadian Geophysical Unions. May 17-21. Montreal.

http://www.sciencenews.org/articles/20040605/note14ref.asp

Nominate Your Friends!

Two MGWA Officer Positions Open for 2005

Call for Nominations: The MGWA membership needs to fill two officer positions — Treasurer and President-Elect — for the year 2005.

The Treasurer oversees MGWA financial matters, reviews financial reports and assists with meeting planning. The President-Elect takes a leadership role in the planning of one or more of the MGWA meetings while "learning the ropes" of MGWA leadership. Here's a chance for you or someone you nominate to get in on the front end of ground-water resource protection in Minnesota.

The Treasurer serves a two-year term, and the President-Elect serves a year before becoming President in 2006, followed by a year as past-president. Send your nominations by November 1 to MGWA, 4779 126th St. North, White Bear Lake, MN 55110-5910, or by e-mail to: Office@mgwa.org.

MGWA Thanks its Corporate Members

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Putting the Twin Cities Metropolitan Area Groundwater Model to Work

For many years, water resource managers expressed the need for a groundwater management tool in the seven-county Twin Cities Metropolitan Area of Minnesota. To fulfill this general need, as well as its own internal need to better understand groundwater contamination problems, Minnesota Pollution Control Agency staff began constructing the Twin Cities Metropolitan Area Groundwater Model (Metro Model) in 1996. The Metro Model is a regional groundwater flow model that is supported by a wide range of databases and information. It is used to simulate flow in several aquifers in and around the Twin Cities area. In addition to the internal support that the MPCA provided, the effort was funded by the Legislative Commission on Minnesota Resources from 1996 through 1999, as well as the U.S. Environmental Protection Agency. The MPCA continued to support the effort through 2001, when budget reductions led the MPCA to focus limited resources on its highest priorities.

Although the funding cut means that the Metro Model and its supporting databases can no longer be enhanced to reflect our most current understanding of the groundwater flow systems, they remain available on the MPCA website at http://www.pca.state.mn.us/water/groundwater/metromodel.html. They continue to be an important starting point for examining local and regional scale groundwater issues in the Metropolitan Area. It is used for wellhead protection planning, resource assessment, contaminant migration evaluation, and other groundwater related questions. The databases developed for the model are also very valuable for understanding hydrogeology and developing groundwater models with other modeling software.

The Metro Model actually consists of four independent but connectable, regional scale

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? Question of the Quarter! ?

The Question of the Quarter is a regular feature of our newsletter. Each quarter a different question is posed and all members are invited to offer their "two cents worth." Last quarter's question is discussed below. This quarter's question is:

Is Minnesota's Ground Water Renewable?

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

newsletter@mgwa.org

The following answers last Quarter's Question: What percentage of Minnesota's population that is served by community water systems gets ground water? Read and find out!

Role of the Minnesota Department of Health in Protecting Drinking Water

By Stew Thornley, Minnesota Department of Health

The drinking water program at the Minnesota Department of Health (MDH) is responsible for the administration and enforcement of the federal Safe Drinking Water Act (SDWA) in the state. Established in 1974, the SDWA sets regulations and standards for public water systems—those that serve water to the public. Public water systems include supplies for municipalities as well as places like manufactured housing developments, schools, businesses, resorts, highway rest stops and other facilities that have their own supply of water and serve it to more than 25 people on a regular basis. Water from a public water system is more thoroughly tested and regulated than water from any other source, including bottled water.

Public water systems are broken down into several categories. Community systems are those that serve water to people in their homes. This would include municipal water systems as well as places like nursing homes or housing developments. Noncommunity systems serve water to people in places other than their homes, and these are broken down into two more categories. Noncommunity nontransient systems serve the same group of people, such as workers or students, in places like businesses and schools. Noncommunity transient systems serve a temporary group of people, such as travelers; these would be found in places like resorts, restaurants, and highway rest stops.

This distinction is significant because it determines how extensively the water is analyzed, and it also points out a distinction with drinking-water contaminants—whether the health effects caused by them are acute or chronic. Acute contaminants (bacteria, nitrite, and nitrate) are those that have the potential to cause illness or disease right away as opposed to chronic contaminants (chemicals, metals, radiological contaminants), those that need to be consumed over a long period of time to create the potential for adverse health effects.

For systems that serve a transient group of people, which comprise approximately 80 percent of the total number of public water systems in Minnesota, the water needs to be analyzed only for acute contaminants that can create an immediate health hazard.

For the other water systems, which serve the same people over and over, the water is tested for acute and chronic contaminants.

Approximately 75 percent of Minnesotans get their primary source of water—that is, the water in their home—from a public water system. The other 25 percent have a private well, but even these people will be affected by public water supplies as they consume water at work or school or while traveling throughout the state.

In Minnesota, we have nearly 8,500 public water systems, the sixth highest total among states in the country. The reason for our high ranking is an abundance of groundwater in most parts of Minnesota, which makes it possible to drill a well and find an adequate supply of water. We're known as the Land of 10,000 Lakes but there's plenty of water under the ground, as well.

Nearly all of the public water systems in the state use groundwater as opposed to surface water—rivers and lakes—as their water source. Of Minnesota's 960 community water systems, only 23 use surface water as their source. In terms of number of systems, the disparity is great, but the percentage is much closer in terms of number of people served. The state's largest cities—Minneapolis, St. Paul, and Duluth—use primarily surface water, and approximately 40 percent of the population served by a public water system gets its water from a surface-water source. Even though there may not be many of them, the surface-water systems serve a relatively large percentage of the population. The remaining 60 percent of the population served by a community water system get their water primarily from a groundwater source.

Surface water sources are open to the atmosphere and can be more easily contaminated through animal or human use, so they require more complicated treatment. Minnesota law requires that treatment for surface-water sources include both disinfection and filtration.

Groundwater in some ways is more insulated from environmental hazards. However, groundwater can have its own challenges. It may contain more nitrate from fertilizers and pesticides. Another issue with groundwater is the presence of radiological elements, such as radium and radon, and inorganic chemicals, such as arsenic, which are part of the earth's crust and can dissolve into underground water supplies.

As the situation with naturally occurring contaminants in the ground illustrates, threats to our drinking water come from a variety of sources. In addition to pollution and nature, treatment itself can pose problems. While chlorine rids water of microbiological contaminants, it can combine with organic material in the water to form harmful by-products, such as trihalomethanes and haloacetic acids, which are carcinogenic. Even the distribution system can contaminate the

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water, as lead and copper from household plumbing can dissolve into the water. Public water systems have to be alert to all these potential problems in their effort to provide safe drinking water to people's taps.

An ongoing threat to a continued safe supply of water is aging infrastructure. Drinking water infrastructure is out of sight and rarely thought about. Crumbling roads and bridges are apparent to citizens, but much of the infrastructure of a drinking-water system—wells, distribution pipes, treatment plants—is less obvious.

Fortunately, a 1996 amendment to the federal Safe Drinking Water Act created a funding mechanism to address this issue. It was a revolving loan fund that enables states to issue below-market-rate loans to water systems for capital improvements to maintain compliance with the Safe Drinking Water Act.

The 1996 amendments to the Safe Drinking Water Act included an expansion of efforts already underway to protect public drinking water wells from contamination from human activities. It's much easier and cheaper to keep contaminants out of water sources than it is to remove the contaminants once they're in there. Source water protection involves determining possible sources of contamination and the vulnerability of the water sources to contamination, then finding ways of protecting the source.

Protection of the source often requires land use changes, that could be mandated by laws and ordinances, but many times effective change is voluntary, a result of businesses and individuals agreeing to change operations. This demonstrates the importance of raising awareness about drinking water; citizens are more likely to cooperate on such initiatives as source water protection if they understand why their efforts are significant.

Toward this end, water utilities each year must issue a water quality report to their customers. The reports have to contain information on the source of the system's water as well as the monitoring results for the previous calendar year. The goal of these reports is to advance consumers' understanding of drinking water and to heighten awareness of the need to protect water resources.

In addition, in Minnesota, the drinking-water program has been issuing an annual report about the condition of the state's drinking water since 1995.

Mechanisms are in place to provide the public with safe drinking water. In addition to the protection of source waters and treatment to remove harmful contaminants, there is extensive testing which we at the MDH administer to ensure the safety of the water. If a problem is detected, corrective actions are taken, including notification of those served by the water system.

Our water supply is generally in good shape in Minnesota although ongoing vigilance is necessary to ensure the supply and quality of water in the state. Safe drinking water doesn't happen by accident. It requires the efforts of a lot of dedicated professionals that treat and monitor the water. It also requires the involvement of all citizens.

Source of Well Pollution Found — TCE solvent is from the site of a defunct metal fabricating shop in Lake Elmo

By Mary Divine, Pioneer Press. Reprinted with permission. The article appeared in the Pioneer Press on Friday, July 30, 2004.

Officials said Thursday they have found a major source for the chemical solvent that has contaminated at least 140 wells across Baytown Township. Officials from the Minnesota Pollution Control Agency found trichloroethylene (TCE) concentrations of 50,000 parts per billion, or 10,000 times the recommended exposure limit, in the ground water near Hagberg's Country Market in Lake Elmo – the site of a former metal fabricating shop. TCE is used mainly to remove grease from metal parts. Health Department officials said Thursday that there is no possibility of being exposed to TCE at the Hagberg site, and said TCE had not been found in the well that serves the Country Market, the feed store and the dentist office on site.

Bill and Pat Hagberg purchased the four-acre property in 1972. Pollution control agency officials stressed that there is no indication the Hagbergs contributed to the TCE contamination. "We've done everything we can," said Bill Hagberg Jr., meat department manager at the store at 11325 Stillwater Blvd. "We are confident that it was nothing that we did. It was an unfortunate inheritance of the land." State officials on Thursday could not conclusively identify the name or owner of the metal shop.

Now that such a major concentration of TCE has been found, pollution control agency officials say they can work on treating it. The agency will determine if chemical treatment, soil removal, soil-vapor extraction or groundwater pump-and-treat technologies would best mitigate the pollution, said Mike Rafferty, a spokesman for the agency. "It's a huge relief because now it seems there will be a solution to cleaning up the contamination and to really get the majority of the contamination out," said Cindy Weckwerth, program manager for Washington County's Public Health and Environment Department.

To date, about 140 of the estimated 400 wells tested in Baytown Township, West Lakeland Township, Bayport and Lake Elmo have tested at levels higher than the recommended exposure limit set by the Health Department. All the wells have been fitted with granular-activated carbon filters to remove the TCE. TCE also was found in one of Bayport's municipal wells, but has remained below the 5 parts per billion limit for municipal water supplies. Long-term exposure to high levels of TCE in drinking water has been linked to liver and kidney cancer and associated with birth defects. Lake Elmo City Administrator Martin Rafferty said the city would work with state and county officials to take whatever precautionary measures are needed to protect the health of the community.

Although pollution agency officials say the Lake Elmo Airport still is considered a possible source of the TCE contamination, airport officials say this week's discovery one mile northwest of the airport disputes that. "It appears that it has moved east to the airport from (the Hagberg) site," said Pat Hogan, spokesman for the Metropolitan Airports Commission, which owns the Lake Elmo Airport. "We believe that this is a clear indication that the airport was not the source of the contamination." The commission has spent about $1 million on groundwater testing and for the installation of carbon filters on wells. "We'll be exploring whether we can recover any of the funds that we've expended." Hogan said.

Metro Model, cont.

groundwater models representing five aquifers. Three of the models, known as the province models, represent the upper aquifers (glacial drift, St. Peter Sandstone and Prairie du Chien-Jordan aquifer), and are divided by the major rivers in the region. Figure 1 shows the location of the three province models in the Metro Area. The fourth model is a deep aquifer model representing the Franconia-Ironton-Galesville and Mt. Simon-Hinkley aquifers underlying southeastern Minnesota. Figure 2 shows the extent of the deep aquifer model. All of the models are relatively simple, developed on a coarse scale, and include only known major hydrogeologic features. This allows users to focus on local scale models without expending effort to determine the regional groundwater flow conditions. Users typically represent localized conditions by adding details into the regional framework that the Metro Model provides.

Northwest Metro Water Supply Management

Since 2002, the Metropolitan Council (Council) has funded a quarter time of an MPCA staff member to refine the Metro Model and develop a Northwest Metro Model for water supply planning in the northwest metro area. Significant growth is planned for the I-94/Mississipi River corridor in the area where there is no access to the prolific Prairie du Chien/Jordan aquifer (see the July 2003 Indicator of the Month at: http://pca.state.mn.us/programs/indicators/iom-0703.html Ground Water and Urban Growth – Running on Empty?). The remaining available aquifers have variable, often limited yields, statutory limitations on their use or are more susceptible to influences on the land surface (contamination or drought). The Council will use the model to evaluate various scenarios of growth and potential limitations of the aquifers to supply future demand. Figure 3 shows the area of focus in the Northwest Metro area.

Development of the Northwest Metro Model is occurring in two phases. During the first phase, a regional scale groundwater model was developed that combined elements from the four previous models into a three-layer model. The layers represent the buried drift, Franconia-Ironton-Galesville, and Mt. Simon-Hinkley aquifers. Refinements were made in each of the layers and updated pumping information was incorporated. Adjustments to the elevation of the aquifers were made to more closely match the conditions in the Northwest Metro area.

Phase two of the effort has concentrated on developing a more detailed groundwater model of the northwest portion of the metropolitan area. Additional detail was added to the model based on geologic information collected through studies performed by the Minnesota Geological Survey (MGS) for the Council. In addition, the model was altered so that the interaction between the Franconia-Ironton-Galesville and glacial drift aquifers could more closely be represented. The model is currently being tested against local well pumping tests recently performed in the area. Model test runs early in this step have shown favorable results to the pumping test and refinements continue.

The resulting groundwater model will be used to develop different pumping scenarios of the modeled aquifers that might result from the future use of the land surface. As population growth and economic development occur in the northwest portion of the seven counties, it will become vital to know where groundwater is available and in what quantities. It will also be important to add data to the model about how development will affect aquifer recharge as more impervious surfaces are created.

Use of the Metro Model in Wellhead Protection Planning

Wellhead protection is a federally mandated program designed to safeguard drinking water supplies. The Minnesota Department of Health implements this program in Minnesota. Work products from the Metro Model Project are used in many ways to support wellhead protection planning in Minnesota. First, the ancillary datasets produced during the Metro Model development effort are used in daily evaluation and conceptualization of wellhead projects, as well as for calibration of related groundwater models. Second, the Metro Model input for all aquifers younger than the Jordan were used as the basis for more detailed sub-regional models prepared for the Minnesota Department of Health. Finally, the Metro Model is used directly for wellhead protection area (WHPA) delineations for wells completed in the Franconia-

— *Continued on next page*

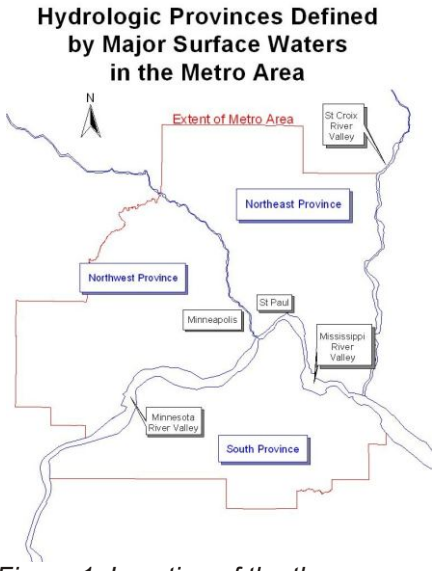


Figure 1: Location of the three province models in the Metro Area.

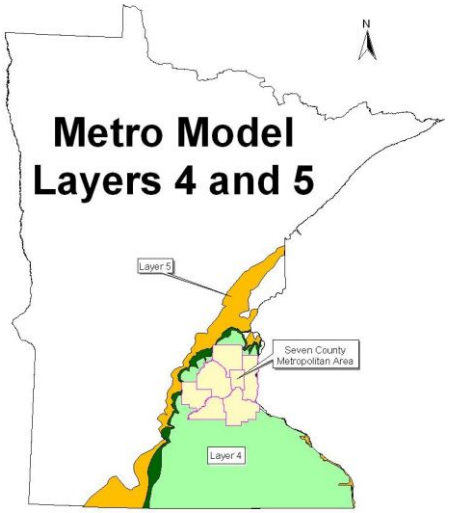


Figure 2: Extent of the deep aquifer model.

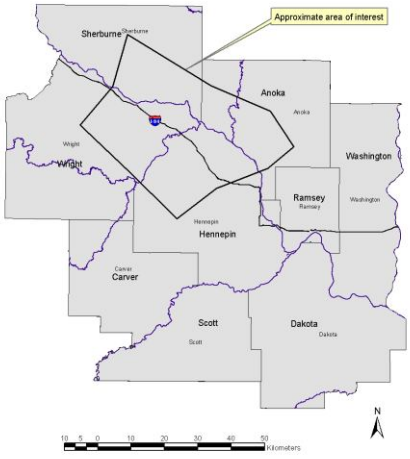


Figure 3: Area of focus in the Northwest Metro area.

Metro Model, cont.

Ironton-Galesville or Mt. Simon Aquifer Systems. These systems are generally deep bedrock systems about which local information is sparse, regional information is generalized, and are little affected by local recharge and discharge. Such deep-confined settings are well suited for using the Metro Model for conducting the WHPA delineation. Its availability saves time and money for communities working to meet the requirements of the wellhead protection rule. An example is the WHPA generated for the city of St. Bonifacius, located in southwestern Hennepin County.

St. Bonifacius serves a population of about 2100 through its water distribution system. Three wells in a single well field are operated by the City. Each of the wells is completed in the Mt. Simon Sandstone, which is represented by layer 5 in the Metro Model. The Mt. Simon is a very deep bedrock aquifer that is largely isolated from near-surface fluctuations. Groundwater flow conditions are generally characterized only on a regional basis. The WHPA for St. Bonifacius is shown in Figure 4. The City has established management controls for this area that they are implementing to safeguard the aquifer. The city's implementation strategy takes into account land use in the area determined by the model to be supplying water to the city's wells. The strategy considers the vulnerability of the aquifer system and specific land uses within the domain of the WHPA.

Metro Model Future

The value of the Metro Model effort has been shown many times. The Model and supporting databases are routinely used for local and regional groundwater modeling efforts. The future of the Metro Model may lie with the Council. The Council has identified a need for water supply planning on a regional scale and the use of a tool such as the Metro Model as an integral part to this planning. However, additional resources would be necessary for the Council to assume an active role in the long-term maintenance of the Metro Model. As development continues in the Metro Area and additional pressure is placed on our groundwater supplies the necessary resources for maintaining the Metro Model may become available.

Submitted by Doug Hansen (MPCA) and Chris Elvrum (Met Council).

Figure 4: Wellhead Protection Area, St. Bonifacius, Minnesota

Crow Wing County Geologic Atlas, Part A, Completed

Part A of the Crow Wing County Geologic Atlas is now available. The report, recently published by the Minnesota Geological Survey, includes six map plates that describe the county's surficial and bedrock geology, Quaternary stratigraphy, bedrock topography, depth to bedrock, and mineral endowment. Crow Wing County includes the Cuyuna Iron Range and the rapidly-developing Brainerd lakes area.

The Crow Wing County Geologic Atlas is the 16th report in the County Geologic Atlas Series, a cooperative effort of the Minnesota Geological Survey, the Minnesota Department of Natural Resources, Division of Waters and Crow Wing County.

This portion of the atlas will be joined in the future by Part B, to be prepared by the Minnesota DNR Waters, which will include maps of ground water and pollution sensitivity.

County Geologic Atlases underway include Crow Wing, Wabasha, Pope, and Todd. In addition to Crow Wing County, Part A reports for Wabasha and Pope counties have also been published by the Minnesota Geological Survey. Reports in the County Geologic Atlas Series may be purchased at the Minnesota Geological Survey, Publications Sales Office, at 2642 University Avenue, St. Paul, 55114, phone (612) 627-4782.

The Crow Wing County Geologic Atlas was prepared using geographic information systems (GIS) technology. Data files and portable document format (PDF) images of plates are available for download. Data for Part A of the report is downloadable from the MGS ftp site at ftp://156.98.153.1/pub3/c-16/ . More information is on the MGS web site at http://www.geo.umn.edu/mgs/ . For more information about other reports in the atlas series and access to completed Part B reports please see the DNR Waters web site at http://www.dnr.state.mn.us/waters/groundwater_section/mapping/status.html .

For more information contact Dale Setterholm, Minnesota Geological Survey, at (612) 627-4780 or Jan Falteisek, DNR Waters, at (651) 297-3877.

Newsletter Survey Results

The MGWA newsletter team distributed a survey to MGWA members asking readers what they thought about the newsletter. Members were asked how much time they spend reading the newsletter, what types of articles they read and how satisfied they are with the layout and design. Members for whom we had e-mail in the database were invited to complete the survey online, while those with whom we could not communicate electronically were sent a paper copy. Thanks to everyone who responded to the survey.

More than half of the readers spend between 10 and 60 minutes reading an issue. Most thought the length of the newsletter is about right. About half of the readers (78 responses) view the newsletter on a computer screen, while the other half (80 responses) either get a hard copy in the mail or print it out to read it. 96% were “generally satisfied” or “very satisfied” with the technical accuracy, depth and quality of the newsletter articles.

The newsletter team will be using your comments and opinions to redesign the MGWA newsletter to better meet the needs of the readership.

You can view the complete summary of the electonically completed survey results on the MGWA web site: www.mgwa.org/survey/nl2004.html

Help Wanted: Newsletter Format to be Updated

The newsletter survey has indicated that almost half of the members of MGWA read the newsletter on the computer screen. In response to the question on how the newsletter can better meet their needs, most members want a design that is easier to read and updated. Comments received indicated that the present format with three columns is awkward to read on screen. The newsletter team is looking for help in developing an updated version that is compatible with reading on screen. If you would be interested in a short-term commitment to develop a new format, please contact Norm Mofjeld, the editor, at (651) 215-0823 or send him an e-mail at norman.mofjeld@health.state.mn.us.

6. Why do you read the MGWA newsletter? (check all that apply)

	Response Percent	Response Total
Professional development	86.6%	123
Current and emerging issues in Minnesota ground water	**92.3%**	**131**
Colleague news	56.3%	80
Board and Committee activities	23.9%	34
MGWA Foundation news	16.9%	24
View Other (please specify)	4.9%	7
Total Respondents		**142**
(skipped this question)		9

7. What current MGWA Newsletter features are of greatest interest to you? (check all that apply)

	Response Percent	Response Total
President’s Column	39.4%	56
News Articles	83.1%	118
Technical Articles	**89.4%**	**127**
Capillary Fringe	47.9%	68
Conference Summaries	43.7%	62
Field Trip Summaries	34.5%	49
Question of the Quarter	22.5%	32
Member News	34.5%	49
View Other (please list)	5.6%	8
Total Respondents		**142**

8. What features or topics would you like to see get more attention in the MGWA Newsletter? (check all that apply)

	Response Percent	Response Total
Member news	18.8%	25
Interviews or profiles of members or newsmakers	21.8%	29
Technical articles	60.2%	80
Training opportunities	48.9%	65
Ground water policy articles	**66.9%**	**89**
Opinion articles	39.8%	53
View Other (please list)	6.8%	9
Total Respondents		**133**
(skipped this question)		18

10. How satisfied are you with editing, layout, design, and overall preparation of the newsletter?

	Response Percent	Response Total
Very satisfied	31.7%	45
Generally satisfied	**56.3%**	**80**
Rarely satisfied	0.7%	1
Unsatisfied.	0.7%	1
Comments	10.6%	15
Total Respondents		**142**
(skipped this question)		9

MGWA Advertising Opportunities

MGWA can place your ad in several ways: in the newsletter (quarterly), in the directory (annual, with periodic updates) on our web page, and through e-mailing to MGWA members. Two of the less-well-known options are:

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. Direct your orders and questions concerning advertising rates and policy to: Jim Aiken, Advertising Manager, c/o MGWA, 4779 126th Street, White Bear Lake MN 55110-5910; Phone (952)470-0983.

Corporate Membership Rates

Membership Levels	Annual Package Cost	Annual per Item Cost	Annual Savings	Percent Savings
Basic Level	$350	$369	$19	5%
Standard Level	$505	$583	$78	15%
Industry Leader	$735	$886	$151	20%
Corporate Sponsor	$1530	$1986	$456	30%

Corporate Membership Features:

- Basic Level: Business Card ad in newsletter and membership directory, "Lobby Copy" of membership directory, web page sidebar, Certificate of Membership, and up to 4 employee memberships
- 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

Please make checks payable to "Minnesota Ground Water Association" or "MGWA." Direct your orders and questions concerning corporate memberships and policy to the Advertising Manager: Jim Aiken, MGWA Advertising Manager, c/o MGWA, 4779 126 St N, White Bear Lake MN 55110; Email jaiken@mccainassociates.com.

Calcareous Fen Workshop

MGWA teamed up with the City of Rochester, Rochester Public Utilities, and the Minnesota Department of Natural Resources this past June to offer “Calcareous Fens of Southeastern Minnesota Technical Workshop and Field Trip”.

A group of about 50 gathered on Friday June 18th at Rochester Public Utilities conference facility to hear a full day’s worth of classroom presentations. On Saturday we reconvened at Ottawa Bluffs calcareous fen.

Our first classroom session was an introduction to the concept of ‘calcareous fens’ by Dr. Jeanette Leete, Minnesota DNR. Because calcareous fens receive special protection in Minnesota Statutes it is important to be sure that everyone is talking about the same thing, so we reviewed the criteria that are used to determine which wetlands are calcareous fens. The criteria include vascular plant and moss occurrence, soil characteristics, water chemistry values, and the nature of the hydrogeologic setting, thus there were classroom

— continued on page 15

Clockwise from top: Welby Smith (on left) describes the calcareous fen plant community habitat concept, Joannes Janssens (facing camera) demonstrates moss collection procedures in the field, fen orchid (Liparis loeselii), Jeanette Leete demonstrates the length of a flow path, Steve Eggers teaching grass identification. Photos by Sean Hunt

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.

Name_____Full-Time Student? _____

Affiliation/Employer _____

Work Address _____

City, State, Zip Code_____

Work Telephone Number _____E-mail _____

Fax Number_____

Home Address _____

City, State, Zip Code_____

Home Telephone Number _____

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 _____

Fen Workshop, cont.

sessions dealing with each of these criteria.

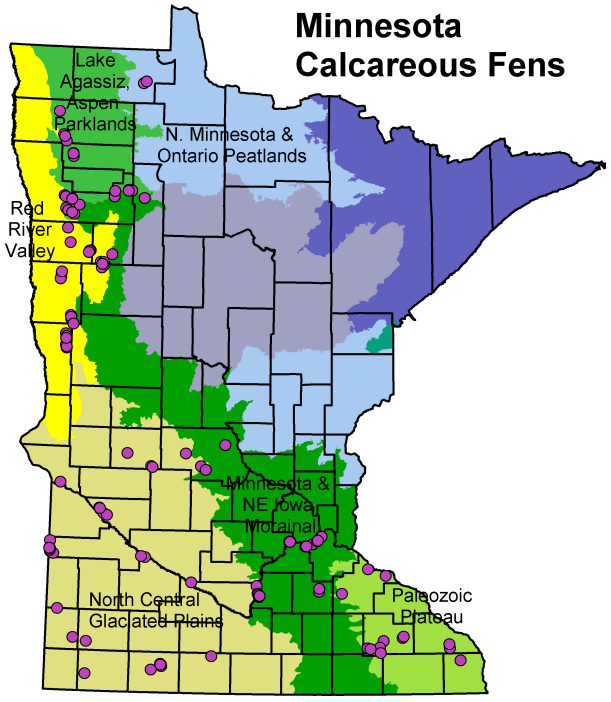
Welby Smith, Minnesota DNR, explained which plants are calcareous fen obligates and he gave clues on how best to identify some of the plants that most botanists find difficult to distinguish from their look-alikes.

George Poch, McGhie and Betts, who probably has the most experience of anyone in southeastern calcareous fens, described the typical organic soil found in that setting: muck, not peat. He even brought a soil profile along so that he could show the group what an organic soil really looks like.

Bryophytes (mosses to you and me) have recently been added to the technical criteria for identifying calcareous fens, which is intended to greatly extend the times of the year when determinations can be made. Dr. Joannes Janssens, Lambda Max, presented an introduction to bryophytes so we could become familiar with the terms used by 'moss-people', after which we plunged into a presentation on the use of mosses for calcareous fen identification.

After lunch, which was arranged by Debra Lohmeyer, Minnesota DNR, who, along with Barb Huberty of the City of Rochester, flawlessly coordinated the logistics of the two-day meeting, we started in on the physical properties of calcareous fens.

Dr. James Almendinger, Science Museum of Minnesota, presented the results of his research on Minnesota calcareous fen hydrology and geochemistry. His presentation clearly explained how these wetlands can accumulate carbonates. Then Dr. Leete reported on the continuation of the work begun by Dr. Almendinger and funded by the US Environmental Protection Agency that sampled water chemistry in fen and non-fen settings in three regions of Minnesota: Northwest, Southwest, and Southeast. In short, water chemistry cannot serve to distinguish between calcareous fen wetlands and non-fen wetlands because the results show almost complete overlap of the ranges for conductivity, alkalinity, and calcium content.



— Graphic from MN DNR Waters

Case studies were next on the agenda. Jeremy Pavlish, Minnesota DNR Waters, reported on two calcareous fens he has studied because they were located next to active mining operations: Felton Prairie Fen, which is downgradient of a below-water-table sand and gravel mine and Ottawa Bluffs Fen, which is within the cone of depression of pumping from the Unimin sand mine at Ottawa. Steve Eggers, US Army Corps of Engineers reported on his work over more than a decade to keep Savage Fen from being encroached upon despite many proposals for development.

We finished the classroom day with a discussion of how DNR interprets its regulatory authority over calcareous fens in Minnesota and of how all involved parties might better work together to efficiently resolve planning issues surrounding calcareous fens, especially in the rapidly developing Rochester area.

—Valeriana edulis, one of the weirder-looking plants found in southeastern Minnesota calcareous fens. Photo by Welby Smith.

Saturday's field trip to Ottawa Bluffs Fen was graciously permitted by the owner, Cynthia Mines. We met and breakfasted at the City of Rochester Offices and then car-pooled to the Ottawa offices of Unimin Corporation where we were kindly provided picnicking and restroom facilities; our thanks are owed particularly to the person who ended up having to sweep out the organic soil samples our boots left in Unimin's office corridor!

First we climbed to the top of the Ottawa Bluffs, a Nature Conservancy preserve, to view the hydrologic setting of the fen and the adjacent mine. Field presentations were given by Kathy Metzker, water chemistry; Jeanette Leete, calcareous fen hydrology; Steve Eggers and Welby Smith, vascular plants of calcareous fens; and Joannes Janssens and Erna Janssens-Verbelen, collection of mosses for identification. The fact that several people in attendance had quite a bit of practical wetland experience made it a useful day of learning from each other.

In summary, this two-day course was a great opportunity to learn more about a topic that had become a pressing local issue in the southeast. In the future MGWA will seek other opportunities to cooperate with other organizations to hold Technical Workshops in response to immediate needs.

— Submitted by Sean Hunt, MN DNR

MGWA Board Meeting Minutes

May 6, 2004

Place: Keys Café Lexington and Larpenteur in St. Paul, Minnesota

Attending: Chris Elvrum, President; Laurel Reeves, President Elect; Eric Hansen, Treasurer; Jon Pollock, Secretary; Jennie Leete, WRI; Sean Hunt, WRI; Norm Mofjeld, Editor.

Treasurer's Report: Spring Conference brought in about $10,400.00. Will receive information from Foundation prior to transferring income from 2003 to Foundation endowment or to Foundation operating funds.

Membership: Membership information passed out by Sean, currently 578 members.

Web Page: E-mail being used to inform members of events. First five volumes of newsletter have been scanned.

Education: Science Museum well being postponed until fall so that we don't mess up the 'Big Back Yard' during its inaugural season.

Newsletter: Letter from MGWA to Minnesota House of Representatives will be in Newsletter. There was a presentation of other articles to be published in future newsletters.

Old Business: Officer Manual - Jennie will discuss officer positions with each officer.
Legislative Update – Some legislators were pleased with letter from MGWA concerning water conservation in Burnsville.
Fall Field Trip – MGWA will not be doing our own trip. WGWA looking into trip near Minnesota. Laurel will help them find stops and leaders, but MGWA will not sponsor due to the potential liability and our already packed schedule.

New Business: Spring Conference – Seeking dates that don't conflict with AIPG if at all possible. Potential 2005 dates April 11 (Monday), 13 (Wednesday), and 15 (Friday). First choice is the 13th as it is a Wednesday. Fall 2005 potential dates include November 16 and 17.
Laptop Computer – MGWA does not own a computer. A computer is needed to store and access MGWA records and to process information and payments at conferences. Motion to approve up to $2,500.00 for the purchase of a laptop computer for the MGWA. Unanimously approved.

June 9, 2004

Place: Keys Café Lexington and Larpenteur in St. Paul, Minnesota

Attending: Chris Elvrum, President; Laurel Reeves, President Elect; Eric Hansen, Treasurer; Marty Bonnell, Past President; Jon Pollock, Secretary; Jennie Leete, WRI; Sean Hunt, WRI; Steve Robertson, Newsletter.

Treasurer: The MGWA purchased a laptop computer for approximately $2400.00. Current cash balance is approximately $35,500.00.

Web Page: Calcareous Fen Conference and letter from MGWA to the legislature concerning water conservation with regard to the Burnsville quarry project are posted. Demo of a few volumes of newsletters that have been scanned have been given to the newsletter team for review.

Foundation: Approximately $2000.00 from MGWA Foundation allocated to Science Museum. $500.00 granted to Girl Scouts "Make a Splash" event.

Education: Science Museum approached the LCMR for funding for the Science Museum project.

Newsletter: June issue completed. Draft survey concerning newsletter was passed out for review and comment.

Old Business: WGWA Fall Field Trip – MGWA can offer the following: email announcement, web page posting, assistance finding speakers, but will not be a sponsor.

New Business: Transfer of Funds – Motion passed: "Transfer $9000.00 to MGWA Foundation with 50% to unrestricted funds and 50% to endowment."
Calcareous Fen Technical Workshop and Field Trip – Brochure passed out at Board Meeting

Fall Conference – Possible topic of Data Management and Technology in Ground Water. Will discuss at next Board Meeting.

July 7th, 2004

Place: Keys Café, Lexington and Larpenteur, St. Paul

Attending: Chris Elvrum, President; Laurel Reeves, President-Elect; Eric Hansen, Treasurer; Norm Mofjeld; Jennie Leete, WRI; Sean Hunt, WRI.

Treasurer's Report: Eric reported that money ($9,000) has been transferred to the Foundation (see June minutes).

Membership: Sean reported that our membership is "off the chart"!…at least the until the "y" axis is adjusted. Membership now at 616 members, the highest since at least 1992; however, we have only 5 student members. We should address this issue in the near future.

Web Page Report: Sean reported that the Newsletter Survey is on the web. Conference information and registration for the recent Calcareous Fen Conference was done primarily through the web page.

Scanning Project Report: Sean reported no activity this past month; approx. one-third complete.

Education Committee Report: Chris reported that the LCMR recommended the Science Museum project for funding at $150,000 for the outdoor (back yard) display. The Science Museum has indicated that the ground water aspect is their first priority.

Newsletter Report: Sean reported that the survey was sent out on July 4. Sent to 555 members for whom we have email addresses with excellent response in the first few days. Paper versions of the survey will be sent to those with no e-mail in our records. Norm indicated that the next Newsletter deadline is the second week in August.

Old Business WGWA/WAIPG Fall Field Trip: They set their dates for Sept 24-25 – Laurel reported that conference planning is underway for a tour of southeast Minnesota and southwest Wisconsin. The Minnesota portion of the trip is shaping up with several potential site speakers having committed.
Calcareous Fen Technical Workshop and Field Trip: Jennie reported that with 40 paid attendees this conference appears to have made a small profit, perhaps $320. It was moved (Elvrum/Hansen) to pay an honorarium in lieu of salary (Leete's) in the amount of the profit, if any, to be paid to the DNR Gift Account for the purpose of calcareous fen study. Carried.
Fall Conference: Chris's suggestion that we issue a "Call for Papers" for this conference was discussed. It was decided that Chris would draft that call and circulate the draft via email so that the call can be published later this month. It was thought

— continued on next page

Board Minutes, cont.

that the topic, "Data Management and Technology in Ground Water", could attract commercial exhibitors and poster presentations so Jennie will check to be certain that we have enough space at the conference facility.

August 4, 2004

Place: Keys Café Lexington and Larpenteur in St. Paul, Minnesota

Attending: Chris Elvrum, President; Laurel Reeves, President Elect; Marty Bonnell, Past President; Jon Pollock, Secretary; Sean Hunt, WRI; Norm Mofjeld, Newsletter.

Treasurer: No report.

Membership: No report.

Web Page: Renewed hosting contract at approx $100.00/ yr. Update of main web page: new directory, presentations of Calcareous Fen Conference. Sent email out regarding USGS lecture, reminders of newsletter survey.

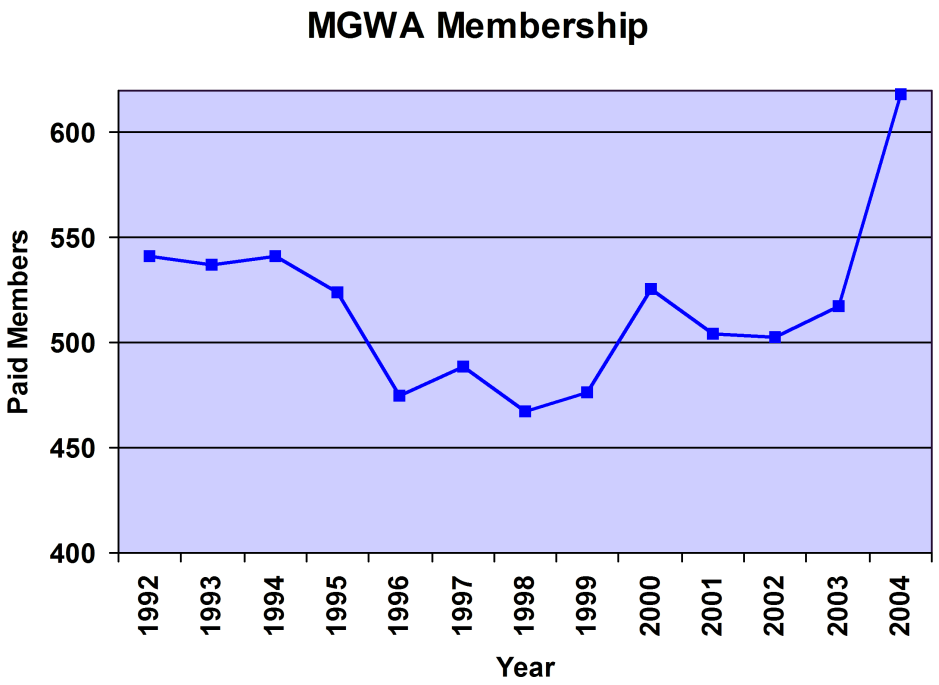
Foundation: Will meet Sept 7, 2004.

Education: Funding of display to go along with well at the Science Museum recommended for funding by the LCMR. Next step is for legislature to determine whether to approve.

Newsletter: Norm requested items for Sept issue.

Old Business Fall Conference – Sent out request for abstracts. Received two abstracts. Need to find speakers by end of month. Survey – Discussed results. Generally favorable.

New Business: Water Law Conference – Organizers contacted MGWA looking for speakers. Chris will speak with them.



Membership is Off the Charts!

After holding steady for a few years with about 500 members, this year membership increased to over 600. Membership was off the charts…until the graph axis was adjusted to accommodate the growth (See chart above). Increased membership is due to new members joining at Spring and Fall meetings and retaining existing members.

By remaining a member you benefit personally and you provide a benefit to your community. You have the opportunity to learn from other members and contribute to the ground water community's knowledge. You also ensure the association is viable to continue working at its goals. Keep up the good work.

Continuing Education Opportunities

The MGWA Web page has a section called "Calendar" that lists upcoming conferences and links to other web sites for educational opportunities. If you are interested in obtaining continuing education credits for driller or Professional Geoscientist licensure renewal, this is a good source of information. The Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geoscience and Interior Design does not pre-approve continuing education credits for conferences or workshops. If you are aware of a conference or workshop that is not on the calendar or to be found among its links, please contact MGWA at (651) 276-8208 or send an email to office@mgwa.org.

MGWA Fall Conference

Management and Analysis of Ground Water Data November 16, 2004

See below for a taste of what's to come:

Overview of Geologic Data Management: Jim Reed, RockWare
Real-time Data Acquisition: Geoff Delin, USGS
Real-time Water Quality Monitoring, John Dustman, Summit EnviroSolutions
Implementing Wireless and PDA Technology in Remote Data Acquisition, David Odd, Campbell Scientific
Network Design – Beyond the Minimum, Melinda Erickson, University of Minnesota
CWI: Current Status and Future Plans, Brian Johnson, MDH
Data Visualization – Eye Candy or Scientific Tool? Jim Reed Rockware
Implementation of 3D Geologic Mapping, Harvey Thorleifson, MGS
Arsenic Data Presentation and Analysis, Rich Soule, MDH
Improved characterization of the Prairie du Chien Group, Robert Tipping, MGS
Incorporating Public Databases into Distributed Parameter Ground Water Models, Tina Pint, Barr Engineering
Online Data Retrieval and Data Entry, Laurel Reeves, MN DNR

Web Page Volunteer?

We'd like our web page to be more attractive, but our current efforts need to be directed more to content than appearance until we can find some help. Please contact the editor at newsletter@mgwa.org if you would be willing to assist with this project.

Minnesota Ground Water Association Newsletter Advertising Policy

Annual Rate for Display ads:

Business Card	$66
Quarter Page	$121
Half Page	$225
Full Page	$425

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.

Please make checks payable to "Minnesota Ground Water Association" or "MGWA." Direct your orders and questions concerning advertising rates and policy to the Advertising Manager: Jim Aiken, Advertising Manager, c/o MGWA, 4779 126th Street, White Bear Lake MN 55110-5910; Phone (952)470-0983; jaiken@mccainassociates.com