

Minnesota Ground Water Association

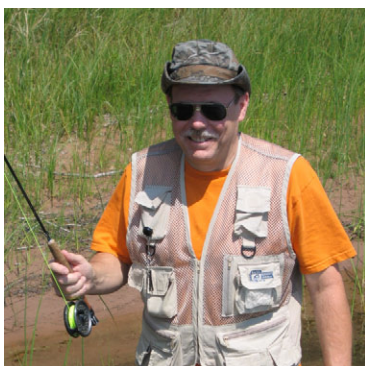
www.mgwa.org

Newsletter

September 2007
Volume 26, Number 3

Featured:

- ◆ Clean Water Challenge in Tanzania, page 1
- ◆ Ethanol Production, Regulation and Water Use, page 5
- ◆ Public Water Supplies and Biofuel Facilities, page 7



MGWA President
Jeff Stoner

Inside:

Member News	2
Professional News	5
Ham Lake Fire and Drinking Water	8
Gunflint Fire Reveals Impact Evidence	9
Pope Co. Atlas Workshop	11
Reports and Publications	14
Ground Water History	15
Question of the Quarter	18
Conferences and Training	22
MGWA Foundation News	26
MGWA Board Minutes	28

Minnesotans Take on Clean Water Challenge in Tanzania

By Stu Grubb, Emmons and Olivier
Resources, Inc.

Well drillers, engineers, and other volunteers from Minnesota are doing remarkable work to bring clean water to Tanzania. I was fortunate to travel to Tanzania in April 2007 to work on wells and a water distribution system in a rural village. The trip was very rewarding, but it highlighted the technical and social challenges of working in a developing country.

To understand the work that is being done in Tanzania, you first need to know a little about the country's history and government. Tanzania is located on the southeast coast of Africa. In 1995, the country held its first true two-party elections. The politicians who won that election have done much to reduce corruption and encourage development, including welcoming missionaries and other non-governmental organizations (NGOs) into the country. In recent years they have avoided the



Teaching and Training the Next Generation

wars and political unrest that have plagued many neighboring countries.

Tanzania is still desperately poor. The average annual income is less than \$400 per year. Statistics say that as many as 40 percent of the

continued on page 3

President's Letter

I hope your summer has been productive in the business of ground water and spiced with a little rest and relaxation, particularly in our beautiful state. Some of my memories will be tied to fishing for elusive trout in spring-fed creeks of southern Minnesota. Fortunately for the trout, I'm a novice fly fisherman (and those few that were tricked were returned). I was fortunate to learn some new skills and knowledge from a fly fisherman with much more experience. One tip, learned for those clear and low-gradient reaches of the stream, was that our movement in wading even ever so carefully upstream causes ripples readily seen by the trout. This subtle effect gives trout notice that something was not right in their habitat and the whole idea of presenting a food source for the trout's future taking can be entirely lost — an opportunity also lost for the fisher person. A second tip was "strive for a good first cast and presentation rather than nu-

merous line slaps to the stream surface—keep practicing."

I'm encouraged to report that there will be plenty of chances for the MGWA membership to consider your collective experiences, learn a little, and to think about the future during the Fall Conference on November 13. This conference is intended to challenge our members to step outside of the box momentarily and imagine what the future might be in ground water for the next generation (25-35 years). To help us with that challenge, we have invited futurist Jack Bacon to help us in both a scientific and entertaining way. His day job as a National Aeronautical and Space Administration engineer developing the international space station gives him a good appreciation of the scientific method. His avocation as a futurist has resulted in the

continued on page 2

MGWA Newsletter Team

Editor-in-Chief

Norm Mofjeld

current issue editor

Minnesota Dept. of Health
(651)201-4593

norman.mofjeld@health.state.mn.us

Tom Clark

Minnesota Pollution Control Agency

tom.p.clark@pca.state.mn.us

Jan Falteisek

Minnesota Dept. of Natural Resources

jan.falteisek@dnr.state.mn.us

Steve Robertson

Minnesota Dept. of Health

steve.robertson@health.state.mn.us

Kurt Schroeder

Minnesota Pollution Control Agency

kurt.schroeder@pca.state.mn.us

Advertising Manager

Jim Aiken

Barr Engineering Co.
(952)832-2740

jaiken@barr.com

MGWA Management & Publications

Dr. Jeanette Leete
WRI Association Mgmt Co.
(651)276-8208

office@mgwa.org

MGWA Web Page

Visit www.mgwa.org for MGWA information between newsletters and to conduct membership and conference transactions.

Newsletter Deadlines

Issue	Due to Editor
December '07	09/08/2007

© Minnesota Ground Water Association. ISSN: 1098-0504

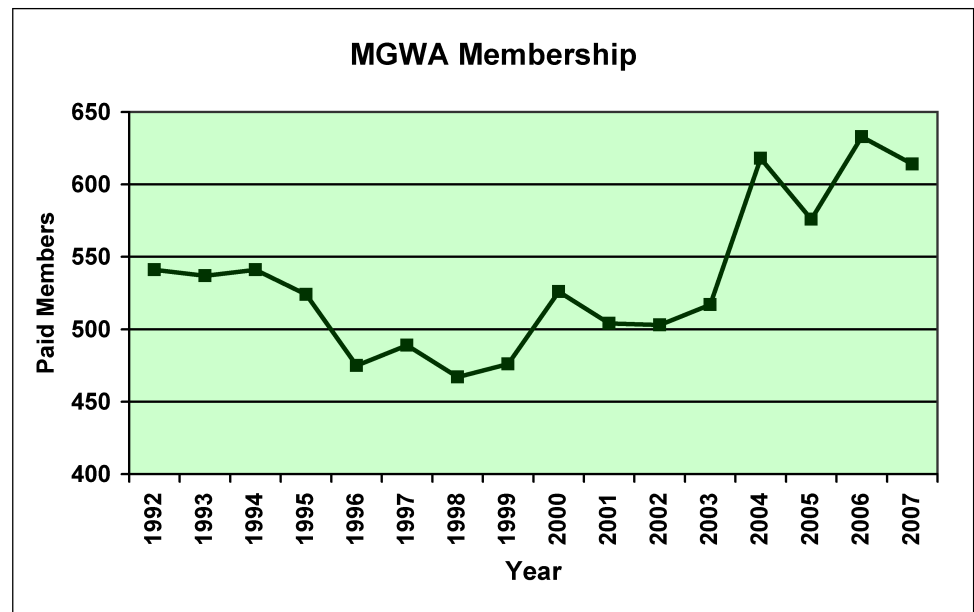
Material in this publication may be reprinted if appropriate credit is given.

Views expressed in this publication do not reflect official MGWA policy unless expressly stated as such.

MGWA NEWS

Member News

Randy Hunt of the U.S. Geological Survey in Middleton, Wisconsin, has been elected as a 2007 Geological Society of America (GSA) Fellow. In recognition of his election, Mary P. Anderson has noted "Randy Hunt is cited for his work on the role of groundwater in wetland processes, wetland restoration, and [wetland] creation. He is also a leader in the groundwater modeling community, particularly in bridging finite difference modeling with analytic element modeling and the application of inverse models."



MGWA membership remains strong. The membership count as shown above is final because dues received after August are counted toward 2008.

President's Letter, cont.

publication of a few books on the subject. I hope he will be able to inspire our membership to apply our collective history and experiences to an innovative future of ground water in Minnesota.

As mentioned in the spring newsletter, the conference will be linked to a special 25th anniversary volume of the MGWA Newsletter that will contain a sampling of past scientific articles with selected commentaries on the current and projected value of those topics for the future. This anniversary volume also intends to capture some history of ground-water activities, events, people, and policies in Minnesota. While thinking about this futuristic theme for the fall conference and anniversary volume, news about the collapse of Interstate 35W bridge was rattling in my head. I was not aware of any membership of MGWA or their immediate families directly affected by this tragedy and hope that is the case for all of you. Then I thought about how the pace of advancements in information and technology

could be stalled by our need as a society to attend to aging infrastructure. If we must concentrate on rebuilding, would that not take energy away from new methods and understanding and from conveying that understanding of less visible resources, such as ground water? Then I also remembered the many contacts from around the nation asking Minnesotans about our well being and safety from the bridge collapse. People's attitudes make a difference in how we move forward. So my thoughts then focused on our responsibility as an association of professionals to provide information and education to facilitate the wise management and preservation of Minnesota ground waters. What do you think?

I encourage you to practice casting your imagination for a positive future for Minnesota ground water. Bring those innovative ideas to MGWA forums, such as the Conference, for a chance at a good catch. Remember to invite a student or intern.

Jeff Stoner, MGWA President

Water Project in Tanzania, cont.

children born do not survive to age 18. Waterborne diseases from unsafe water systems contribute significantly to the problem.

St. Paul Partners is a non-profit organization started by Keith Olson, a well driller from St. Paul. They have established a base of operations in Iringa in south-central Tanzania. They have two drill rigs and have a network of workers and suppliers who can install and service wells in the area. Through the Evangelical Lutheran Church in America (ELCA) and the Lutheran Church in Tanzania, they match Minnesota congregations to Tanzanian congregations and rural villages. The Minnesota churches use these connections to raise money and send volunteers who complete water systems and other projects in the villages.

My congregation, Trinity Lutheran Church in Stillwater, was paired with the village of Mwatasi located about 50 kilometers south of Iringa. The village has about 5000 people clustered in three areas known as Mwatasi, Ibwanje, and Menighi. The local economy is almost entirely based on subsistence farming. The houses have no modern conveniences such as electricity, phones, or water except for a few radios and cell phones running on batteries. The only motor vehicles we saw belonged to outsiders visiting the village.

Admittedly, I went to Mwatasi expecting to find deplorable conditions and people begging for help. Instead, I found beautiful rolling hills, lush crops and vegetation (it was the end of the rainy season), and pleasant temperatures. The people were friendly, welcoming, and helpful and often wanted to practice their English conversation skills. Some had lived in other cities or countries and had moved back to Mwatasi. The lack of cars and slower pace of life in the village were very pleasant, at least for the few days we were there.

Mwatasi is located in the southern highlands of Tanzania at an elevation of 6500 ft. Houses are clustered along a high ridge, with farm fields and water sources down in the valleys. The water sources are open sumps dug where springs or ephemeral streams are found at the base of the hills. The villagers, usually women and children, carry five-gallon buckets of water on their heads about 150 feet up steep paths to their houses. As expected, the water regularly tests positive for a host of microor-

ganisms and other pollutants.

In the 1970's the socialist government of Tanzania built water towers and distribution systems in many rural villages. Mwatasi's water tower never held any water, except when it was filled by hand to impress some government officials. In the 1980's a Danish NGO put in hydraulic powered pumps to pump water from a nearby river. The system was underpowered and soon fell into disrepair. This is a common problem among water systems installed in developing countries. NGOs often report that 50% of the systems, including simple hand pumps, are not operating only a short time after they are installed for a variety of reasons including lack of maintenance and spare parts.

Our group was determined to avoid these



Preparing to install a new well

problems, and so we made a long-term, broad-based commitment to building and maintaining the water system. Teams of volunteers have visited many times, usually staying about two weeks. Planning and organizing began in 2005. In 2006 wells were drilled and pump houses built. In 2007 we made upgrades to generators and the distribution center. In 2008 we will continue to work with village leaders on maintaining the system and expanding it throughout the village. Along with designing and constructing the water system, we have also worked with the village on hygiene and other social issues related to improving people's general health.

The water system we designed for the village consisted of four 4-inch wells located near the

— continued on page 4

2007 MGWA Board

Past President

Dale Setterholm

Minnesota Geological Survey
(612)627-4780 x223
sette001@umn.edu

President

Jeff Stoner

U. S. Geological Survey
(763)783-3106
stoner@usgs.gov

President-Elect

Stu Grubb

Emmons and Olivier
(651)770-8448
sgrubb@eorinc.com

Secretary/Membership

Jon Pollock

Frontline Environmental
(952)892-0367
jp.frontline@frontiernet.net

Treasurer

Craig Kurtz

3M Company
(763)757-6876
craigkurtz@msn.com

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.

MGWA's Corporate Members

Leggette, Brashears & Graham, Inc.

Barr Engineering Company

Geomatrix

ARCADIS

Interpoll, Inc.

WSP Environmental Strategies

Liesch Associates, Inc.

TestAmerica, Inc.

Northeast Technical Services

Soil Engineering Testing, Inc.

Links at www.mgwa.org

Water Project in Tanzania, cont.

existing water supply sumps. Each well was about 30 feet deep and completed in a fine sand formation. Submersible electric pumps move water up the hill to the distribution system and the water tower. The pumps are powered by diesel generators located in pump houses at the top of the hill. The distribution system includes about 12 community taps located throughout the village.

On our April trip, we attempted to install a new well without a drill rig, using a trash pump and a wash down fitting. This method forces water through a valve at the bottom of the well casing. The water brings sand and other "cuttings" to the surface as the well pipe advances under its own weight. This method works well in silt and sand. Unfortunately, we encountered an unexpected clay layer about 16 feet below ground, which halted progress until the pump broke down. With the nearest hardware store 3½ hours away and very limited time in the village, we decided to abandon the new well and instead focus on installing a new diesel generator, bringing the old water tower on line, and expanding the distribution system throughout Mwatasi and Ibwanje. The four existing wells are performing well enough to provide adequate supply to the village for now.

One of my personal high points was creating a map of the village from topographic data available on the Internet and aerial photographs. No accurate map of the village existed, which made any sort of planning or surveying unnecessarily difficult. I presented and explained the map to local teachers and village leaders, along with some simple concepts of geology and ground water flow. It was fascinating to watch as they became oriented to the map and began to recognize familiar features. Hopefully, someone local will take this basic information and use it to improve the village.

A key principle when doing charitable work in other countries is to have the local people invest in the project as much as possible, both with money and labor. We established a target contribution of about \$600, which the village raised before we arrived. With the help of the town administrator, we found no shortage of eager workers of all ages willing to dig trenches, lay pipe, and help with equipment. It was a fun challenge to set up a new diesel generator and pump controller with people who do not speak your language and may have never even operated a light switch be-

fore. We can only wonder if they learned enough to repair and replace the equipment in future years.

Our greatest challenge has not been technical, but social. Years of rule by the British and then by a socialist government have left the villagers with almost no local government and no collective knowledge of how to run a municipal system. Concepts of how to maintain roads, schools, and water systems or even how to run a town meeting seem very foreign to them. We have been working with them to teach accounting methods, establish a functioning water management board, and collect taxes to pay for system operation and maintenance (about 50 cents per month per household).

On a more recent visit to the village, members from our organization found that the water system had not been operating for several weeks. The reason given was that there was no money to buy diesel fuel. While this may be true, the cause of the lack of money to secure safe water is very deeply rooted in complex social issues. Everyone in the village sincerely wants to have a safe community water supply system, but they lack the political structure, organizational skills, and personal priorities to make it happen. We are committed to continuing to work with the village and find long-term solutions that will work for them. We have funding to expand and complete the water distribution system to Menighi, but we will not move forward until the village can demonstrate that they are able to sustain operation of the existing system.

I would encourage all MGWA members to volunteer their time to assist with water projects in developing countries. Your skills are desperately needed. It is a rare opportunity to make a huge difference and improve the lives of many people. More information about St. Paul Partners is available at www.stpaulpartners.com.



Save the Date!

**MGWA's 25th
Anniversary
Conference and
Celebration**

**November 13, 2007
See page 22 for details.**

PROFESSIONAL NEWS

MPCA Hires New Ambient Ground Water Monitoring Coordinator

Sharon (Sherri) Kroening has accepted the position of Ambient Ground Water Monitoring Program Coordinator in the Ground Water and Flow Monitoring Unit at MPCA. Some MGWA members may recall that Sherri worked on the National Water Quality Assessment (NAWQA) program at the Minnesota district office of the U.S. Geological Survey (USGS) during the 1990's. In 2000, she moved to the Orlando, Florida office of USGS where she has worked on a variety of programs including studies of the hydrogeology and chemistry of the karstic Upper Floridan aquifer in central Florida and an assessment of the presence of pesticides associated with citrus agriculture in ground water fed lakes in the Lake Wales Ridge area. Sherri brings a strong set of qualifications to the job and she and her family are looking forward to moving back to Minnesota.

The previous incumbent in this position, **Melinda (Mindy) Erickson** is moving on to an Environmental Research Scientist position in MPCA's Environmental Reporting and Special Studies Unit, where she will be working on emerging contaminant issues, including studies of perfluorochemicals (PFCs) in Minnesota ground and surface water.

Finally, the ambient program has hired hydrologist **David Duffey** to provide program support and direction to student interns. David comes to the program well-prepared, as he was a student intern himself during the summer of 2004. David comes to MPCA from Tetra Tech, Inc. Congratulations to Sherri, Mindy and David!

ASSOCIATION NEWS

Two MGWA Officers Sought for 2008

Call for Nominations: The MGWA membership needs to fill two officer positions—Secretary and President-Elect—for the year 2008.

The **Secretary** keeps the minutes of all MGWA Board Meetings and is the custodian of the Association's official paperwork. He or she also assists with conference 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 Secretary serves a two-year term, and the President-Elect serves a year before becoming President in 2009, followed by a year as Past-President. The Past-President also serves on the MGWA Foundation Board. 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.

TECHNICAL FEATURE

Ethanol Production, Regulation and Water Use in Minnesota

Ethanol, also known as ethyl alcohol or grain alcohol, is a clear, colorless liquid made by fermenting and distilling plant material, most commonly corn. A bushel of corn produces as up to three gallons of ethanol. Historically, the most common use of ethanol has been as a performance enhancer in gasoline and, more recently, as a major component of gasoline at a blend of up to 85 percent (called E85) for vehicles whose engines are designed to run on it (called flex-fuel vehicles or FFVs).

Ethanol demand has increased rapidly recently because of the favorable economics of ethanol versus gasoline, albeit enhanced by government subsidies, and the need to replace methyl tertiary-butyl ether (MTBE) as an octane booster in gasoline. MTBE has been implicated in ground water contamination incidents, especially in the eastern United States. Ethanol's growth has been so dramatic that there are now concerns about the amount of corn available to meet competing demands for food and fuel, and the amount of water needed to convert corn to ethanol, currently about four gallons per gallon of ethanol.

Minnesota is a leading state in ethanol production and leads the nation with an E85 fueling network of nearly 400 retail and fleet filling stations as of August 2007. Over 150,000 FFVs are currently registered in Minnesota. About 1200 of these are registered to state agencies as a part of the Governor's mandate to reduce the use of gasoline in on-road vehicles owned by the state by 50 percent by 2015.

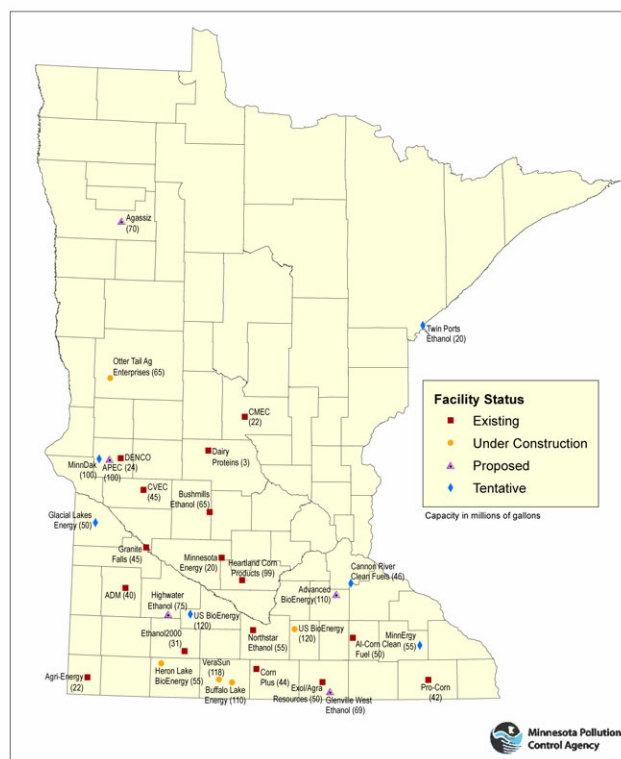


Figure 1: Ethanol facilities in Minnesota, present and future (August 3, 2007)

— continued on page 6

Ethanol Production, Regulation and Water Use in Minnesota, cont.

Minnesota currently has 16 operating ethanol facilities with a production capacity of 620 million gallons per year. Five facilities are currently under construction that will add an additional 450 million gallons capacity. Minnesota's annual ethanol production capacity should exceed one billion gallons in 2008. About a dozen facilities are in various planning stages that could add another 750 million gallons capacity in the coming years.

Most of Minnesota's operating and planned ethanol facilities are located along and south of the Minnesota River (Figure 1) where most of the state's corn is grown. Unfortunately, this is an area of the state where water resources, particularly ground water, may be limited. In addition, ground water in southwest Minnesota may contain high dissolved solids and sulfates which may affect its use as process water.

As mentioned above, ethanol production is a "wet industry" that requires large volumes of water. Consumptive water use by ethanol plants largely comes from evaporation during cooling and wastewater discharge. Ethanol plants are designed to recycle water within the plant. Water utilization is generally about 10 gallons per minute for each million gallons of yearly ethanol production. A typical plant producing 50 million gallons of ethanol per year would need a constant supply of 500 gallons per minute.

Modern ethanol plants have sophisticated water treatment facilities to enable them to use and recycle lower quality water, which may include sewage treatment plant effluent. Conjunctive siting of ethanol plants and sewage treatment facilities is being considered as growth of the ethanol industry continues. Another option may be to site ethanol and other biofuel facilities in conjunction with public water supply systems. Concerns with these conjunctive siting scenarios, are discussed in the article following this one ("Public Water Supply Wells and Biofuel Facilities").

The Minnesota Department of Natural Resources (DNR) maintains records on water use by specific plants compared to the amount of ethanol produced (based on production figures reported to the Minnesota Department of Agriculture (MDA), which may be incomplete). Minnesota's ethanol plants report a wide range of water use, with most plants ranging from 3.6 to 6.1 gallons of water consumed per gallon of ethanol produced (Table 1). The ratio of water used to ethanol produced has declined from an average of 5.8:1 in 1998 to 4.2:1 in 2005, indicating that the plants are achieving greater efficiency over time.

The MPCA, along with other state agencies, has developed a guidance document for building an ethanol facility in Minnesota. Other agencies included in the development of this document include MDA, DNR, the Department of Employment and Economic Development, the Department of Transportation, and the Department of Commerce. *Planning and Constructing an Ethanol Plant in Minnesota: A Guidance Document* may be accessed at: www.pca.state.mn.us/publications/ethanol-guidancedoc.pdf

Minnesota DNR has developed the following information about environmental review and permitting for water quantity protection:

- Ethanol Plants and Environmental Review by DNR: www.pca.state.mn.us/publications/presentations/ethanol-0207-dnr.pdf
- Water Supply Management and Appropriation Permitting Regulations: www.pca.state.mn.us/publications/presentations/ethanol-0207-2-dnr.pdf
- Permitting and Environmental Review Process for a Large Water User: www.pca.state.mn.us/publications/presentations/ethanol-dnrpermitting.pdf

Submitted by Tom Clark, MGWA Newsletter Team

Table 1: Gallons of water used per gallon of ethanol produced for selected facilities, 1998 - 2005. MN DNR Waters.

Gallons of water used per gallon of ethanol produced

Ethanol Producers	1998	1999	2000	2001	2002	2003	2004	2005
Albert Lea (Exol/Agra Resources)	6.3	6.3	6.0	6.1	5.6	5.5	5.2	4.9
Benson (Chippewa Valley Ethanol)	3.3	3.5	4.8	3.5	3.5	3.1	3.2	3.6
Bingham Lake (Ethanol2000)	4.0	4.2	4.7	4.6	4.3	4.7	4.2	4.4
Buffalo Lake (MN Energy)	10.6	6.2	7.1	6.9	7.0	5.8	4.6	4.5
Claremont (Al-Corn)	4.6	4.3	4.1	4.2	3.9	5.4	4.5	4.3
Little Falls (Central MN Ethanol)	-	5.9	4.8	4.2	4.1	3.8	3.5	4.2
Luverne (AgriEnergy LLC)	4.9	5.8	5.2	4.8	4.7	4.6	4.5	4.5
Marshall (ADM)	7.7	7.6						
Melrose (Kraft General Foods)	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Morris (DENCO LLC)	9.3	10.0	12.3	8.2	6.0	6.1	6.0	6.1
Preston (Pro-Corn)	5.6	5.2	4.7	4.6	4.4	4.1	3.8	4.0
St. Paul (MN Brewing)	-	-	18.7	7.9	21.9	32.6	12.2	
Winnebago (Corn Plus)	4.1	3.5	3.5	3.5	4.5	4.1	3.9	
Winthrop (Heartland)	4.8	5.1	4.3	5.0	4.1	3.7	4.5	4.2

Source: MN DNR Waters

Public Water Supply Wells and Biofuel Facilities

By Well Management Section, Minnesota Department of Health

Biofuel facilities are refineries that produce compounds used for fuel from organic materials. Currently, most biofuel facilities are producing ethanol and utilize corn as the biomass source, although other raw materials are now being considered. Ethanol production and the construction of new ethanol refineries have increased markedly in Minnesota and throughout the upper Midwest during the past decade. Ethanol production from corn requires significant quantities of water, typically 4.0 - 4.8 gallons of water per gallon of ethanol produced.

Most ethanol plants in Minnesota obtain their water from groundwater. Developers of ethanol plants have used several options for securing the water supply. These options can take many forms, including constructing well(s) exclusively for the use of the plant, constructing well(s) to serve both a plant and an existing public water supply, or simply installing well(s) and connecting other nearby users to create a new public water supply. A developer may even "donate" a well to a municipality, and then purchase the water back. The reasons for these actions can vary, such as being a simple good will gesture towards the local community, switching long-term operation and maintenance costs to a municipality, or being potentially eligible for funding, such as federal funds towards the development of rural water systems.

Regardless of the motivation(s) or circumstances, if a well is to be considered for use as part of a public water supply, it is subject to a high degree of review and approvals by the Minnesota Department of Health (MDH). Constructing a well first and then obtaining approval afterwards for use as a public water supply source is difficult now, and will be nearly impossible when proposed changes to Minnesota Rules, Chapter 4725 (Well Code) become effective later this year.

A community public water supply is defined as a water supply to a residential population that serves at least 15 service connections or at least 25 residents at least six months a year, and includes municipalities, mobile home parks, apartment buildings, and health care residences. Prior to constructing a community well, the following requirements must be met:

- Plans and specifications for the proposed well must be submitted to and approved by the MDH prior to the start of

any work. Approval may include specific corrections to the plans and requirements for notification of MDH for inspection.

- Well site inspection and approval by the MDH.
- MDH approval of Preliminary Wellhead Protection Area Worksheet.
- Proof of property ownership and control.
- Completion of a Capacity Development Worksheet (new systems only).

Even when a water supply well is constructed solely to provide water to the plant, there is a very good chance that the water system at the plant may be a non-community public water supply. A non-community system serves at least 25 persons for at least 60 days a year. A non-transient, non-community system serves the same 25 or more people at least six months a year, and certainly would include a plant with 25 or more employees. Transient non-community systems include all remaining non-community systems and typically include parks, churches, campgrounds, and restaurants. An ethanol plant with a stream of suppliers, truckers, and other individuals may be a transient non-community water supply, especially if water is available to the public. Currently, the requirements for construction of a non-community public water supply well are the same as for any other water supply well. The well contractor must simply notify the MDH prior to start of work and the well must be constructed to current rule requirements. Plan review is not required for the well.

The proposed changes to Minnesota Rules, Chapter 4725 would establish more stringent and specific requirements for construction of a public water supply well (both community and non-community), making "conversion" from a non-public use much more difficult. These more stringent requirements include specific notification procedures, additional separation distances from contamination sources, full-depth grouting of annular space between the bore hole and the well casing, additional disinfection or well development, and installation of a water sampling tap. The MDH anticipates that these changes will become effective by end of 2007.

For general questions regarding public water supply wells, contact Ed Schneider of the MDH at (651) 201-4595. For questions regarding plan review requirements for community water supply wells, contact Brian Noma of the MDH at (651) 201-4683.

McCain
and Associates, Inc.

ENGINEERS & SCIENTISTS
Knowledge. Commitment. Service.

**Environmental Investigation
Groundwater Supply and Quality Improvement
Solid Waste Engineering
Construction Management
General Civil Engineering**

Contact Nick Bonow, 952-346-3859, nbonow@mccainassociates.com

PO Box 429, 5300 Hwy 12, Maple Plain, MN 55359
tel 952-346-3900 | fax 952-346-3901



Total business solutions that add value to your bottom line

Infrastructure

- Transportation
- Water Resources
- PM/CM
- Land Resources

Environment

- Planning and Permitting
- Site Evaluation
- Remediation
- Risk and Associated Services
- Business Solutions

Facilities

- Management Consulting
- Integrated Facilities Management
- Building Design and Engineering
- Global Transaction Services
- Corporate Responsibility

ARCADIS
Infrastructure, environment, facilities

Imagine the result

Drinking Water Supplies and the Ham Lake Fire

By Anita Anderson, Minnesota Department of Health

The Ham Lake forest fire started on May 5, 2007, and burned a total of 75,851 acres: 36,443 acres in the United States along the Gunflint Trail in Minnesota and 39,408 acres in Canada. Many structures were lost to the fire, and many lives disrupted.

The area along the Gunflint Trail is somewhat unique with regard to drinking water. The bedrock geology in the area can make it difficult and expensive to drill a well and obtain an adequate supply of groundwater. Therefore approximately 50% of the businesses, and the majority of private home and cabin owners, use the lakes in the area as their source of drinking water. Public water supplies are required to provide treatment of surface water and conduct daily monitoring to ensure a safe drinking water supply. Private parties make their own decisions regarding treatment and use of the water. Fortunately, water quality monitoring thus far indicates few effects from the fire on the quality of water in the area lakes, and there are few reports of damage to groundwater supplies. There is at least one supply, however, that was impacted in a major way by the fire.

The Trails End Campground is a 33-site campground located at the end of the Gunflint Trail. The Ham Lake Fire passed through Trails End Campground on May 7. The fire burned in a mosaic pattern, reducing some areas to ash while leaving other areas untouched. Unfortunately, the water supply system was located in an area that burned.

Water at the campground is pumped from a deep well and into a storage tank on top of a

hill. Water is supplied by gravity feed from the storage tank to the campground. The building that housed the electrical controls for the well pump system, pipes leading to and from the storage tank, and a backup generator were destroyed in the fire (see Figure 1). In addition, overhead power lines to the campground were burned. The steel storage tank came through relatively unscathed (see Figure 2).

Plumbing has now been repaired and disinfected and a new well-house put in place, and the system is again supplying water to the campground. No changes in water quality have been indicated. After running off a generator for a period of time, the campground installed a solar pump system at the well that will be used on a permanent basis.

All campsites and boat landings are open, and the forest service invites you to take advantage of the unique chance to experience visiting and camping in a post-fire environment!



Figure 2: The steel storage tank was almost unscathed.



Figure 1: Trails End Campground pump house after the Ham Lake Fire.

THEIN WELL

Over 100 Years of Service



- Geo Probing
- Soil Borings
- Monitoring Well
- Remediation Wells
- Angle Drilling
- Rock Coring
- Well Televising
- Gamma/E-logging
- Test/Production Wells
- Pump Sales/Service
- Well Rehabilitation
- Well Abandonment



**Certified Master
Groundwater Contractor**

1-800-450-8000

Forest Fire on the Gunflint Trail leads to discovery of further evidence for an ancient, giant meteorite impact at Sudbury, Ontario, Canada

By Mark Jirsa, Minnesota Geological Survey and Paul Weiblen, University of Minnesota Department of Geology and Geophysics (retired)

It would be small comfort for those whose property was consumed by the Ham Lake fire to learn that in the matter of a few minutes some 1,850 million years ago the entire Gunflint region suffered a far greater catastrophe. The Ham Lake forest fire was nothing compared to the devastation wrought by a meteorite, probably over five miles in diameter that struck the earth at Sudbury, Ontario. The impact scattered a blanket of debris from a crater, estimated to be 160 miles in diameter, over nearly a million square miles. Just as there are benefits from fires in forests, the Sudbury Impact Event is just one of the many geologic processes that produced the scenic wonders of North America.

Minnesota Geological Survey geologist, Mark Jirsa and University of Minnesota Geology Professor Emeritus Paul Weiblen were scheduled to lead a geology field trip at the end of the Gunflint Trail on Saturday, May 12. The trip was part of the annual meeting of the Institute of Lake Superior Geology (ILSG), held during the week at the Lutsen Resort on Lake Superior. As the fire grew from 17,000 to nearly 75,000 acres (117 square miles), the trip was cancelled. However, on May 8, Jirsa visited outcrops where the fire had not yet reached in an attempt to find alternative field trip locations. In the process, he discovered some unusual features in the rocks at the top of the Gunflint Iron Formation. Jirsa showed samples of the rocks to William Addison, a colleague attending the ILSG meeting. Addison recognized immediately that the samples exhibit the typical textures of material that is ejected from a meteorite crater and deposited over a large area around the crater.

Over the past several decades, geologists have reached a consensus that a large meteorite impact occurred at Sudbury Ontario, 1,850 million years ago (Ma). One of the critical pieces of evidence in the Sudbury region is the presence of shatter cone structures (Figure 1), produced as the impact-generated shock wave passed through local sandstone units. This occurred during a time of deposition of

iron-rich sediments (iron-formation) in a shallow ocean basin that covered what is now northeastern Minnesota, southern Ontario, and adjacent regions. The impact created a crater estimated to be more than 160 miles in diameter, much like those visible on the Moon and other terrestrial planets. From studies of lunar craters and model calculations, impacts of this magnitude produce “blankets” of ejected material that cover an area as much as five times the radius of the crater. On the Moon, the ejecta blankets have been relatively easy to identify, because the only active geologic processes have been successive cratering, deposition of ejecta blankets, and in-filling of the cratered terrane on the front side of the Moon with lunar lava. Thus, the geology of the Moon is relatively simple, consisting only of an ancient cratered terrane (the bright reflective highlands), the lava infilling (the dark maria forming the Man in the Moon), and the succession of lunar ejecta blankets that have remained undisturbed over geologic time. By contrast, impact ejecta deposits on Earth are only a minor component in the very complex succession of igneous, sedimentary, and metamorphic rocks that make up our continents. Solely from a consideration of abundance, it is not surprising that impact ejecta have not been readily recognized by geologists. In addition, it is not clear what the effects of Earth’s atmosphere and hydrosphere were on the alteration and preservation of impact ejecta.

The complex products of impact range from angular fragments of preexisting rocks and partially melted, recrystallized, or glassy fragments, to spherules—called accretionary lapilli—that condense



Figure 1. Shatter cone structure produced by shock waves that passed through sandstone in the Sudbury area. In outcrop, the point of the conical structure is toward the impact.

from vapor in the ejecta cloud. The latter are thought to have originated much like hail stones formed in turbulent storm clouds. The shock wave produced by impact transports ejecta away from the site of impact at velocities of miles per second. The shock wave on Earth would produce giant tsunamis. The force of the currents on the bottom of shallow ocean basins would disrupt sediments on the sea floor and rock along shorelines. The layer of sediment that would accumulate after the tsunami had passed would be a very complex mixture of disrupted fragments of seafloor, shoreline, and ejecta material. In exposures on the Gunflint Trail, accretionary lapilli are part of the breccia

continued on page 10



Figure 2. Spherical accretionary lapilli exposed near the Gunflint Trail. They are inferred to have formed from coalesced ash, droplets of melt, and fragments of the target crust, and were projected at ballistic speeds from the impact site more than 500 miles away.

Meteorite Impact, cont.

matrix (Figures 2, 3), implying near-synchronicity of ejecta deposition and tsunami disruption. Oxidation and hydration would further alter impact ejecta. Only a handful of geologists have tackled the difficult problem of recognizing and positively identifying the presumably meager trace of impact ejecta in rock exposures around the world. Addison and a fellow high school science teacher, Gregory Brumpton, driven by curiosity and the belief that ejecta from the Sudbury impact must exist, began a search about 15 years ago in the Thunder Bay area. They were aided and encouraged by the recognition in Australia of unusual rocks with some of the characteristics of ejecta materials described above. Addison and Brumpton focused their search on exposures of Gunflint Iron Formation in the vicinity of Thunder Bay. There they found a 10 to 20 foot thick layer at the top of the Gunflint Iron Formation that fits the now accepted criteria for impact ejecta transported and deposited in a tsunami surge (Addison and others, 2005). This exposure and others were described by earlier geologists and dismissed as a “chaotic mess” at the top of the Gunflint Iron Formation.

Building on and expanding Addison’s and Brumpton’s search for remnants of the elusive Sudbury Impact ejecta blanket, William Cannon of the U.S. Geological Survey (USGS) has found and documented exposures of the ejecta blanket near five iron ranges in the Lake Superior region in Ontario, Michigan, Wisconsin, and Minnesota (Figure 4). Our discovery adds an occurrence in the Gunflint Iron Formation just off the Gunflint Trail. The significance of the ejecta finds is—as Cannon points out—that the layer provides a unique “time-line,” marking a precise moment in the history of rocks with which it is interbedded. It represents a unique layer that formed in the matter of a few days or less, 1,850 million years ago, in an area extending more than 500 miles from the point of impact. In many places, the rocks stratigraphically below ejecta deposits contain fossil remains of cyanobacteria, the earliest preserved forms of life on earth. Excellent examples of these fossil remains, called stromatolites, are well exposed in layers of the Gunflint Iron Formation near the ejecta layer (Figure 5). Iron-formations

approximately equivalent to the Gunflint occur on nearly every continent. This worldwide depositional event is generally thought to be related to the increase in atmospheric oxygen by the process of photosynthesis. At low levels of oxygen, iron would have been soluble in the early oceans; but at higher levels, the dissolved iron was oxidized and highly insoluble. This resulted in precipitation of iron and its incorporation into sediments that were forming at the time. Cyanobacteria are thought to have played a crucial role in the production of atmospheric oxygen, and thus, the origin of iron-formations. William Cannon of the USGS has noted that the worldwide occurrence of iron-formation decreases abruptly in rock layers younger than about 1,850 Ma. Because this is also the date of the Sudbury Impact, Cannon has raised questions about the broader consequences of the impact, the principal one being the extinction of cyanobacteria, which would have abruptly ended the favorable conditions for formation of iron-rich sediments (now sedimentary rocks). Of the approximately 174 scientifically verified impact structures on earth, only one is larger, and few are older, than the Sudbury Impact www.unb.ca/passe/ImpactDatabase. The largest is the



Figure 3. “Tsunami” breccia from a Gunflint Trail exposure containing fragments of iron- and silica-rich sedimentary rocks (white) in a matrix of ejected material including spherical, accretionary lapilli.



Figure 4. Map showing locations of the Sudbury Impact and recently discovered ejecta deposits, including the Gunflint locality shown by star (modified from Cannon and others, 2007).



Figure 5. Domal stromatolite fossils from the Gunflint Iron Formation; “hard evidence” of cyanobacteria growth on the sea floor prior to the impact event.

continued on page 11

Meteorite Impact, cont.

Vredefort structure in South Africa, dated at 2,023 Ma. The oldest is the Suarjarvi Impact on the Fennoscandian shield, at about 2,400 Ma. The Chicxulub Impact on the Yucatan Peninsula of Mexico—thought to have caused worldwide extinction of many species including dinosaurs—is much younger (~65 Ma), and its crater size considerably smaller than that of the Sudbury Impact. The obvious implication is that, although Sudbury ejecta have now been found as much as 500 miles from the site of impact, the event almost certainly had global ramifications.

Further documentation of the Sudbury Impact and its effects on geologic processes at the time will be an increasingly important area of research. The record of meteorite impact on the Moon shows that the size and intensity of impact decreased over time. The craters that define the “Man in the Moon” were created by giant impacts about 4,000 Ma. The impact rate and impactor size decreased to only sporadic, smaller impacts after about 2,500 Ma. Thus, the effects of impact on terrestrial geologic processes before 2,500 Ma should be even more dramatic than those associated with the Sudbury Impact. The challenge for geologists is to recognize these materials in older rocks that have experienced multiple episodes of magmatic intrusion, deformation, deposition, erosion, and vegetation.

Our work on the Gunflint ejecta is in its infancy. One of the principal criteria for identification of impact ejecta is the presence of shards of quartz containing planar deformation features. Another is the presence of high-pressure mineral polymorphs. At this writing, petrographic study of a small sample set has produced no such features; however, mapping, sampling, and petrologic and geochemical analyses are underway. It remains to be discovered what insights can be gleaned about the Sudbury Impact event from study of this new locality.

References

- Addison, W.D., Brumpton, G.R., Vallini, D.A., McNaughton, N.J., Davis, D.W., Kissin, S.A., Fralick, P.W., and Hammond, A.L., 2005, Discovery of distal ejecta from the 1850 Ma Sudbury impact event: *Geology* 33:193-196.
- Cannon, W.F., and Addison, W.D., 2007, The Sudbury Impact layer in the Lake Superior iron ranges: A time-line from the heavens: *Institute of Lake Superior Geology, 53rd Annual Meeting, Lutsen, Minn., v. 53, pt. 1, Proceedings and Abstracts, p. 20-21.*

Learning About Geology and Ground Water with the Pope County Geologic Atlas

By Jan Falteisek, Minnesota Department of Natural Resources, Division of Waters

On June 8, about 50 people gathered in Glenwood, on the shore of Lake Minnewaska, Pope County, to learn about the geology and aquifers of Pope County. The program, designed especially for county staff, area residents, and local decision-makers, introduced the maps and other information contained in the Pope County Geologic Atlas and how they can use it to make better-informed environmental choices. The program included presentations, a problem-solving session with atlas maps, and a field tour. Steve Lawrence, Pope County, was our very welcoming and capable host for the program.



Figure 1. Pope County atlas workshop attendees working hard on the map exercises.

Featured speakers were Ken Harris, Minnesota Geological Survey (MGS); Jim Berg and Julie Aadland, Minnesota Department of Natural Resources, Division of Waters (DNR Waters); and Rich Soule, Minnesota Department of Health. Ken reviewed the geologic history of the area and particularly focused on the multiple glacial events that not only constructed the landscape but also deposited the varying sediments, some of which are important ground water resources. Jim Berg discussed in more detail his work to construct maps of three buried aquifers and their ground-water flow, residence time, and pollution sensitivity. Julie Aadland, a DNR Waters area hydrologist, reviewed the administrative process for responding to situations where pumping from one well may cause problems in another well. Rich Soule, discussed the geologic conditions in Pope County related to elevated concentrations of arsenic in ground water. Pope County is within the area of Minnesota where elevated levels of arsenic due to natural conditions are commonly found. The problem-solving session (Figure 1) introduced those attending to some practical applications of the atlas maps.

The field tour (Figure 2) provided a close-up look at typical aquifer materials at a gravel pit and, from the bus, views of some features of the landscape that revealed its glacial history. At another stop, Mark Zabel, Minnesota Department of Agriculture, reviewed ground-water monitoring results in an intensively irrigated area. Finally, the tour group visited the original springs that supplied water to the city of Glenwood.

continued on page 12

TestAmerica

ANALYTICAL TESTING CORPORATION

TestAmerica Analytical Testing Corporation is now providing custom order sample kits, sample coolers and courier services to the greater Minneapolis/St. Paul area.

Gary Becker
Service Center Manager

7908 Minnetonka Blvd
St. Louis Park, MN 55426
gbecker@testamericainc.com
(800) 593-8519 • Fax (952) 926-2207



Pope County Geologic Atlas Workshop, cont.

DNR Waters completed the Pope County Geologic Atlas, Part B, in 2006, which contains four map plates of ground water conditions and pollution sensitivity. The report joins the five geology plates of the Part A report completed by MGS in 2003.

The Pope County Geologic Atlas can be viewed on-line at www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/popecgga.html. Digital data can also be downloaded through the web page. Additional copies are available from the MGS or Pope County.

The next DNR Waters publication in the County Atlas Series will be the Crow Wing County Geologic Atlas, Part B, which should be available late September. Preliminary plans are underway to hold a similar training workshop later in the year or next spring. Atlas projects in progress include Todd (Part A published), Carlton, McLeod, Carver, Benton, and Chisago. A more regional view of the geology is provided in Part A of the Traverse-Grant Regional Hydrogeologic Assessment, completed by the MGS in 2006. The report can be viewed on-line at: www.geo.umn.edu/mgs/county_atlas/countyatlas.htm. Part B will be completed by DNR Waters in 2008. For more information contact Jan Falteisek, DNR Waters, 651-259-5665.



Figure 2. Jim Berg, DNR Waters, explains the sequence of multiple aquifers in Pope County on the workshop field tour, assisted by Ken Harris, MGS (left) and Jerry Spetzman, Chisago County (right).

Send your comments on any article to
editor@mgwa.org

GEOPHYSICAL SOLUTIONS

"Where's the water?"
Give us a call

Brookfield Resources Inc.
Minneapolis, MN
Phone: 612-849-0650

Geotechnical - Environmental - Archaeology
Ethanol Plants - Licensed/Registered in MN & WI

GEOPHYSICAL SERVICES

Environmental - Geotechnical - Engineering

952.556.1118 Tel
952.556.1119 Fax
info@3dgeophysics.com



Complete Environmental Services Including:

- Groundwater and Surfacewater Sampling
- Sampling and Analysis of Natural Attenuation Parameters
- Landfill Gas Monitoring: EPA 25C and VOC's
- Industrial Waste and Wastewater Compliance Monitoring
- Ambient Air and Meteorological Monitoring
- Source Testing
- Certified Full Service Laboratory

Interpoll Laboratories, Inc.
4500 Ball Road Ne
Circle Pines, Mn 55014-1819
Field@Interpoll-Labs.com

(763) 786-6020
FAX (763) 786-7854



Independent laboratory services, specializing in
testing of groundwater, soil, hazardous wastes,
sludges and drinking water.
On site sampling services available
Call: (800-782-3557)

CONFERENCE AND LECTURE SUMMARIES

Minnesota Environmental Institute Policy Forum Discusses Water Sustainability

On June 20, 2007, about 100 professionals interested in the sustainability of Minnesota's water resources met in St. Paul for a half-day policy forum hosted by the Minnesota Environmental Institute. **Jim Anderson**, co-director of the Water Resources Center at the University of Minnesota, gave an overview of how human-induced changes on the land surface can affect the hydrologic cycle in terms of altered habitats, flow regime changes and decreased aquifer storage.

Chris Elvrum of Metropolitan Council Environmental Services focused on the future of water supplies in the Twin Cities area. Municipal ground water systems in the metropolitan area serve about 1.6 million people in 104 communities. Ground water is a high capacity, relatively low cost option for municipal water supplies. It often requires minimal or no treatment and is less susceptible to droughts than surface water supplies. The down side is that municipalities for the most part have developed their systems independently of one another without a coordinated look at resource sustainability. The Metropolitan Council will be adopting a regional master plan for water supply development in 2008.

Laurel Reeves of the Department of Natural Resources, Waters Division discussed how ground water withdrawal can affect surface water and vice versa. Ground water has many uses, including a source of public water supplies, industrial processing and irrigation. Conservation is critical to maintaining an adequate supply of ground water. Without conservation measures, it is estimated that average water consumption in the United States is 72.5 gallons per capita per day. With conservation measures, that figure can be cut to 49.6 gallons per capita per day. Sustainability can be defined as the use of water to provide for the needs of society now and in the future without unacceptable social, economic and environmental consequences. Besides addressing demands collectively and using water efficiently, it is time to recognize water's true value when considering if a water use scenario is sustainable.

Dale Setterholm, Assistant Director of the Minnesota Geological Survey, showed how recharge and discharge are affected by infrastructure. He made the point that the physical and chemical framework of an aquifer, as well as its hydrologic budget including the stresses placed upon it, must be considered in an analysis of whether or not use of that aquifer is sustainable. **Mark Mason**, professional geologist with the Natural Resources Group, Inc., discussed managing competing needs for limited resources using ethanol production and water use as an example.

Submitted by Tom Clark, MGWA Newsletter Team

Non-Traditional Karst Meeting Held

By Kelton Barr and Douglas Bergstrom, Braun Intertec Corporation

On June 20, 2007, a technical conference on non-traditional karst – that is, karst features and processes occurring in non-carbonate units – was held at the University of Minnesota St. Paul campus conference center. Co-sponsored by the University of Minnesota (U MN) and Braun Intertec, some 35 invitees included academic, regulatory and private-practice technical experts working in the field of karst geology. The purpose of the technical meeting was to formally recognize the presence of karst features and processes in non-carbonate rocks in Minnesota and to discuss its implications for field studies and regulatory applications.

A number of speakers presented technical presentations of case studies. This included an overview by **Professor Calvin Alexander** (U MN), a description of hydrogeomorphic unit mapping in karst systems involving adjoining sandstone units in southeastern Minnesota by **Jeff Green** of the MN Department of Natural Resources, conduit flow features in carbonate and non-carbonate units by **Bob Tipping** of the MN Geological Survey, karst features in the St. Peter Sandstone recently discovered in Woodbury by **Keith Rosvold** (Braun Intertec), karst features and flow systems in the Hinckley Sandstone recently investigated in Pine County by **Kelton Barr** (Braun Intertec), a water well contractor's perspective on conduit flow features in aquifers by **Roger Renner** (E. H. Renner), and a city's perspective on non-traditional karst and its implications by **Steve Kernik** (City of Woodbury). The presentations were followed by a roundtable discussion exploring what is and isn't known about these conditions, the utility of various technical exploration/measurement tools, and a discussion of possible future actions.

In general, there was agreement that the traditional conceptual model of karst formation needs to be broadened to include its existence in non-carbonate rocks, and that there is emerging evidence that these features (most often buried) can play an important role in hydrogeology and surface land use. A significant area of discussion related to development of criteria and commonly accepted definitions for karst among practitioners. Suggested next steps include developing educational information for the geologic, hydrogeologic and related technical communities to enhance awareness through a working group of volunteers. It was agreed that the group would pursue a technical discussion of these issues at the fall 2007 MGWA meeting to begin to bring the larger geologic community into the discussion. Stay tuned!



Analytical Laboratory
Certified Low Level Mercury
Environmental Sampling
Sample Pickup
Water & Wastewater Services
Geoprobe Services

www.netechnical.com 1-800-569-4179
Twin Cities Lab and Service Center 763-497-9111



New Reports Available from the USGS

These reports are available only through the World-Wide Web and a link to the reports via the Internet (URL) is provided. If you do not have access to the Internet, contact the U.S. Geological Survey Minnesota Water Science Center, Mounds View, Minnesota, for a paper copy of the reports at (763) 783-3100.

Estimated Ground-Water Use in Becker, Clay, Douglas, Grant, Otter Tail, and Wilkin Counties, Minnesota, for 2030 and 2050: USGS Scientific Investigations Report 2007-5073, 31 p., T.A. Winterstein. This report was prepared in cooperation with the U.S. Department of the Interior, Bureau of Reclamation.

The Bureau of Reclamation is studying six alternatives for delivering water to the Red River of the North Valley in North Dakota and to the cities of Breckenridge, Moorhead, and East Grand Forks, Minnesota. In order to evaluate these alternatives the Bureau of Reclamation needs estimates of ground-water use for 2030 and 2050 for six counties in Minnesota: Becker, Clay, Douglas, Grant, Otter Tail, and Wilkin Counties. This report (1) describes the methods used to estimate ground-water use for the years 2030 and 2050 for six Minnesota counties, (2) presents the estimated domestic, commercial, industrial, and irrigation ground-water use for the years 2030 and 2050 for these six counties, and (3) compares the estimated ground-water use with published estimates of recharge to three surficial aquifers: Buffalo, Otter Tail, and Pelican River sand plain. The total estimated 2030 ground-water use for the six counties ranges from 27,826 to 36,177 million gallons per year (Mgal/yr), and the total estimated 2050 ground-water use ranges from 31,313 to 41,746 Mgal/yr. pubs.er.usgs.gov/usgspubs/sir/sir20075073.

The author, Thomas Winterstein, can be contacted by telephone (763) 783-3150 or by e-mail at: twinters@usgs.gov.

Nutrients, Suspended Sediment, and Pesticides in Water of the Red River of the North Basin, Minnesota and North Dakota, 1990-2004: USGS Scientific Investigations Report 2007-5065, 36 p. V.G. Christensen. This report was prepared in cooperation with the Minnesota Pollution Control Agency.

The report describes nutrient, suspended sediment, and pesticide data compiled, summarized for the period 1990 through 2004, and compared to other historical data. For 19 of 22 sites, median annual streamflow during the study period exceeded the long-term average streamflow. High streamflow can have a substantial effect on water quality. In water samples from selected stream sites, nitrate plus nitrite concentrations ranged from less than 0.005 to 7.7 milligrams per liter (mg/L); total Kjeldahl nitrogen concentrations ranged from 0.1 to 7.5 mg/L; total phosphorus concentrations ranged from less than 0.005 to 4.14 mg/L; and dissolved phosphorus concentrations ranged from 0.003 to 4.13 mg/L. Nitrate plus nitrite concentrations in ground-water samples for the 1990-2004 period were highest in Sheridan County, North Dakota, and Marshall and Otter Tail Counties in Minnesota. The most frequently detected pesticides or pesticide metabolites were 2, 4-D, bentazon, de-ethylatrazine, metolachlor, picloram, and triallate in surface water and alachlor ethanesulfonic acid (ESA), atrazine, de-ethylatrazine, picloram, and triazine in ground water. Because this report is an update of the 1994 report by Tornes and Brigham, an attempt is made to compare data from the 1970-1990 reporting period to that from

the 1990-2004 reporting period. Sampling schemes, methods, and sites sampled and median annual streamflow, however, are different between the two reporting periods; therefore, a comparison of water-quality is difficult. Generally, a few consistencies and differences were evident and described.

pubs.er.usgs.gov/usgspubs/sir/sir20075065.

The author, Victoria Christensen, can be contacted by telephone (701) 277-0682 or e-mail: vglen@usgs.gov.

Todd County Geologic Atlas, Part A, Completed

Part A of the Todd County Geologic Atlas is now available. The report, recently published by the Minnesota Geological Survey (MGS), includes six map plates that describe the county's surficial and bedrock geology, Quaternary stratigraphy, bedrock topography, depth to bedrock, mineral endowment, and the data sets that support these maps. Todd County in central Minnesota has a wide range of hydrogeologic conditions including areas of limited aquifer availability, areas of vertically stacked aquifers, and areas not yet explored for aquifers. The MGS created a series of maps that depict the areal extent of these aquifers, their tops (by elevation) and their thicknesses (by contours).

The Todd County Geologic Atlas is the 18th report in the County Geologic Atlas Series, a cooperative effort of the MGS; the Minnesota Department of Natural Resources, Division of Waters (DNR Waters); and Todd County. This portion of the atlas will be joined in the future by Part B, to be prepared by DNR Waters, which will include maps of ground water and pollution sensitivity.

County Geologic Atlases are underway in McLeod, Carlton, Carver, Chisago, and Benton Counties. 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 Todd County Geologic Atlas was prepared using geographic information system (GIS) technology. A DVD has been prepared that includes versions of the atlas maps and data accessible to GIS users and to those who do not use this technology. There are also photographs, videos, and explanations of glacial landforms common to this area. 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://mgssun6.mngeo.mn.edu/pub4/c-18/>. More information is on the MGS web site at www.geo.mn.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 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) 259-5665.

GREG BRICK'S GROUND WATER HISTORY

St. Paul's "Diamond Necklace"

By Greg Brick,
Geology Instructor, Normandale College

During my 1993 Twin Cities spring survey, I found that ascending from the level of the Mississippi River to higher elevations in St. Paul, you pass through seven belts of springs, corresponding to various geological contacts and water tables (Brick, 1997). The most coherent spring line is that marking the contact of the glacial drift with the underlying Decorah Shale. In the classification presented by Schwartz (1936), this is called the "third type" of spring, which he defined as "Springs at contact of unconsolidated material with solid rock." Water seeps down through porous material until meeting an impervious layer and is then shed laterally to the river gorge. Schwartz and (1954) published a diagram of this type of spring (see Figure 1).

The earliest allusion to the drift-Decorah spring line may have been the following passage from J.W. Bond's *Minnesota and Its Resources*, published in 1857:

There is one serious objection to the back-grounds of St. Paul, at present, though in time, it will prove to be a great blessing. A great many springs of 'pure cold water' are continually gushing from the base of the above-mentioned hills, forming several bad marshes, and rendering an access to many of the choice situations rather difficult. Good roads have been constructed over these wet places, while the water supplied by the living fountains, can easily be brought in town.

In a previous column, I presented the story of Highland Spring, the only commercial spring in the city of St. Paul, which belongs to this spring line, and one of the springs Bond would presumably have considered a "great blessing," as it was assuredly "brought in town" by a spring-water vendor. In the present article I will describe other springs, less well-known, along the same spring line.

The year 1993 was good for the spring survey, as rainfall was greater than usual, which activated some otherwise dormant intermittent springs—and of course also aggravated the great Mississippi River flood of that year. Since the relevant geological contact was not directly visible in most cases, I inferred its presence based on the elevation of the top of the Decorah Shale, as determined from the bedrock topography map of Mossler (1992). This map has 50-foot contour intervals, and I was most concerned with the 850-900 foot interval. Highland Spring, for example, is 894 feet above sea level (Schwartz, 1936).

I began the hunt in downtown St. Paul by trying to chase down a fugitive reference to the College Avenue springs, located near (or under) the present Minnesota History Center, but couldn't find any trace of them, except perhaps for a persistent sound of rushing water in one of the storm drains below the building. Nearby, on the Walnut Street stairway alongside the James J. Hill House, I encountered my first spring in the series. Having picked up the thread, I continued mapping this spring line through the Irvine Avenue neighborhood of St. Paul, below Summit Avenue, certainly the most scenic part of the project. Historic houses cling to the steep slopes, and I found myself

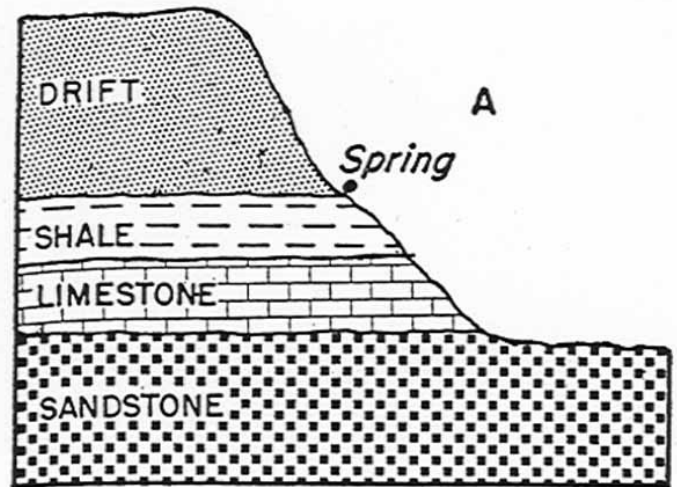


Figure 1. Many springs in the city of St. Paul occur at the contact of the glacial drift with the underlying Decorah Shale. Illustration from Schwartz and Thiel (1954).

spring-hunting midst the gables. At a residence whose address plate said, "Rue Eugene-Dupont," water poured from a crack across the driveway, streaming downhill along the switchbacks before vanishing into a storm drain. The Irvine springs, though charming, bring trouble for residents, causing slick winter pavements, slope movements, and wet basements, as reported in a recent newspaper article (Agha, 2003). Where the spring line crossed Grand Avenue, I found ornate lampposts with water gushing from their bases, which were swathed with filamentous green algae, suggesting an on-going, rather than merely temporary, situation.

Along Pleasant Avenue (as at its intersections with St. Albans, and with St. Clair) I found retaining walls of limestone rubble masonry, at the foot of which there were springs. A local resident told me that his parents used to drink water from the Pleasant Avenue springs. Indeed, the "Pleasant avenue and St. Clair street" location was officially listed in the Annual Report of the City Engineer for the City of St. Paul (1895) under the heading "Street Fountains," along with the clarification, "water from spring." The 1901 report, however, strikes a different tone, describing "the success that has been achieved in the doing away of numerous springs at various parts of the city that in the past have been a considerable source of annoyance, danger and expense during the winter months. These springs have been properly intercepted, and we are not annoyed during the winter months by ice creeping all over the street, forming regular icebergs." Nearby, along greenish outcroppings of Decorah Shale in Linwood Park, I found a place where one of the springs could be observed issuing directly from the ground, supporting a growth of cattails, and measured the flow as 1 gallon per minute (gpm). Randolph and Lexington, of course, is the location of Highland

— continued on page 16

Ground Water History, cont.

Spring, featured in a previous column. Just beyond, the spring line passed through the eponymous Fountain Park, a small, unmarked city park wedged between two residential properties on Lexington Avenue. The spring-line then ran through Dawson Park, also unmarked, where I encountered a healthy flow in the ravine. In McDonough Park, also unmarked, along the north side of St. Paul Avenue, I mapped several more springs. Empson (2006) charmingly refers to these unmarked, neglected city parks as “ghost parks,” and gives a list of them. The association between ghost parks and springs is hardly accidental, because these frequently rugged little lots were donated to the city by individuals who found them useless for building purposes and the city probably did not formally develop them for the same reason. But that happens to be exactly the sort of hillside situation in which the drift-Decorah spring is lurking.

At Sunny Slope Lane, I encountered a rivulet flowing in the street, and traced it back to a private residence (No. 1760). Had I not been walking the spring line I would have missed this one, because it looked merely as if a garden hose had been left running in the front yard. Contacting the owner, I learned that there was a trapdoor in the basement that could be lifted to view the spring.

The next feature I encountered was the Dew Drop, a pond at the foot of “Chapel Hill” (as it’s known locally) on the campus of the College of St. Catherine. The pond’s elevation suggested to me that it was fed by these springs, and just recently I found an old postcard depicting the spring itself (see Figure 2). When I



Figure 2. “The Spring — College of St. Catherine,” postcard dated 1909. Also shows the early Dew Drop Pond in the background. From author’s collection.

spoke with the college archivist, Sister Margery Smith, she informed me that she had never seen an image of the spring anywhere, and asked me if I would donate the postcard to their archives. Postmarked 1909, this artistic rendering—one of the earliest depictions of Highland Park scenery—shows the Dew Drop in the background, before it was landscaped in the 1920s, with the addition of an island. Even though the spring pool was quite shallow (several feet at most), I recall having read in the newspapers years ago of students drowning in it, giving it a melancholy distinction among the springs of St. Paul.

Bruce Erickson, campus engineer, gave me a tour of the Dew Drop this past summer and informed me that St. Catherine’s Library has a sump pump that used to run 24 hours a day owing to the shallow water table. In 2002, during a major reconstruction project, it was decided to deal conclusively with the ground water problem, and a concrete pipe, 24 inches in diameter, was laid under the site, draining into the pond (see Figure 3). Erickson says that the discharge from the pipe is 18 gallons per minute, keeping the pond ice-free in winter. The library’s sump pump rarely activates nowadays.



Figure 3. New pipe draining the St. Kate’s spring to Dew Drop

The University of St. Thomas, just up the spring line, once had something similar to the Dew Drop — the former Lake Mennith, at the same elevation, but this was fed by surface runoff rather than ground water seepage (Empson, 2006). Lake Mennith drained to the Shadow Falls ravine, near the foot of Summit Avenue. At the adjoining St. Paul Seminary, however, there’s a smaller ravine running back from the Mississippi River, at the head of which is a grotto, dated 1919, which displays a sculpture called “Tongues of Fire” (see Figure 4). The dry-weather flow in this ravine is entirely from ground water seepage and on the particular day that I measured its cumulative flow, at the little waterfall in the lower ravine, it was 10 gpm. Ironically, no spring water arises within the grotto itself, calling to mind the old adage about how springs often refuse to bubble up into the marble basins we build for them. I noticed that there were several other small spring cut ravines of this type along the Mississippi River Boulevard, usually containing visible outcrops of greenish Decorah Shale.

continued on page 17

Ground Water History, cont.

The final spring that I dealt with (although the spring line probably continues as a string of wet basements!) was at the Town & Country Club along Marshall Avenue, where there's a spring in the golf course rough. The ground was so waterlogged that it was like walking on a bog mat. Surrounded by giant willow trees, the scenery here probably best recreates the appearance of this type of spring back in the early days of St. Paul; a sign on the gatepost indicated that the club was established in 1888.

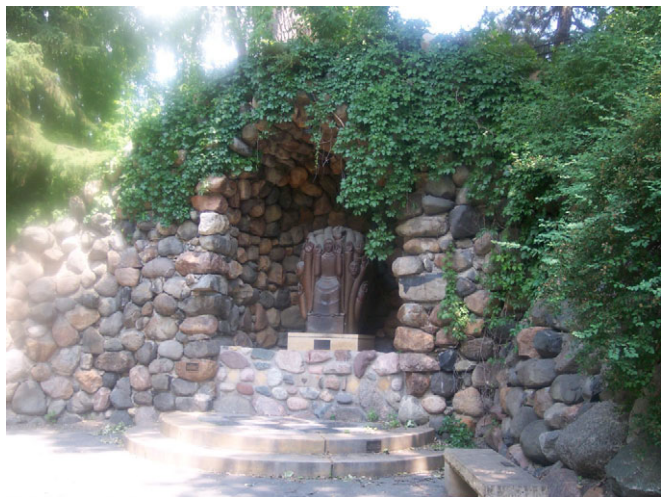


Figure 4. The "Tongues of Fire" grotto at St. Paul Seminary.

When plotted on the topographic map, I fancied that the dozens of sparkling springs along the drift-Decorah contact had the outline of a necklace, eight miles long, looping around the neck of St. Paul, roughly following the Mississippi River. And while waterlogged landowners might object to using the word "diamond" in reference to them, they are St. Paul's most distinctive springs, just as the Platteville spring line best characterizes neighboring Minneapolis.

References

- Agha, M., 2003. "Houses on hills bring mountain of trouble, prompted by groundwater problems, the city will weigh changes to construction rules on hills and bluffs." *St. Paul Pioneer Press*, March 5.
- Bond, J.W., 1857. *Minnesota and Its Resources*. Chicago: Keen & Lee.
- Brick, G.A., 1997. Along the Great Wall: Mapping the Springs of the Twin Cities. *Minnesota Ground Water Association Newsletter* 16 (1): 1-7.
- Empson, D.L., 2006. *The Street Where You Live*. Minneapolis: The University of Minnesota Press.
- Mossler, J.H., 1992. Bedrock Topography. *Geologic Atlas of Ramsey County, Minnesota*. County Atlas Series, Atlas C-7, Plate 4. Minnesota Geological Survey.
- St. Paul Engineering Department, *Annual Report of the City Engineer for the City of St. Paul*.
- Schwartz, G.M., 1936. *The Geology of the Minneapolis-St. Paul Metropolitan Area*. Minneapolis: The University of Minnesota Press.
- Schwartz, G.M., and G.A. Thiel, 1954. *Minnesota's Rocks and Waters*. Minneapolis: The University of Minnesota Press.

**WSP ENVIRONMENTAL STRATEGIES**
AN INTERNATIONAL FIRM WITH FULL SERVICE
CONSULTING INCLUDING:

- ENGINEERING SERVICES
- PHASE I ASSESSMENTS
- REGULATORY/ COMPLIANCE AUDITS
- SITE INVESTIGATION/REMEDATION
- LITIGATION SUPPORT/DUE DILIGENCE

612-343-0510 **FAX: 612-343-0506**

www.wspes.com
123 NORTH THIRD STREET, SUITE 706, MINNEAPOLIS 55401

Phone: (763) 427-6100 **rerenner@ehrenner.com**
Fax: (763) 427-0533 **www.ehrenner.com**
Mobile: (763) 286-9355 **1-(800)-409-9355**

ROGER E. RENNER
President
NGWA Certified Master Ground Water Contractor

E.H. Renner & Sons
INCORPORATED
WELL DRILLING FOR FIVE GENERATIONS
15688 Jarvis Street N.W. Elk River, MN 55330



MGWA
25 Years



SOIL ENGINEERING TESTING, INC.
A Comprehensive Soil Mechanics
Testing Laboratory

Bloomington, MN
(952) 884-6833
www.soilengineeringtesting.com

QUESTION OF THE QUARTER

Question of the Quarter!

Test your knowledge!

Learn something new!

Comment on the Answer to the June '07 Question of the Quarter:

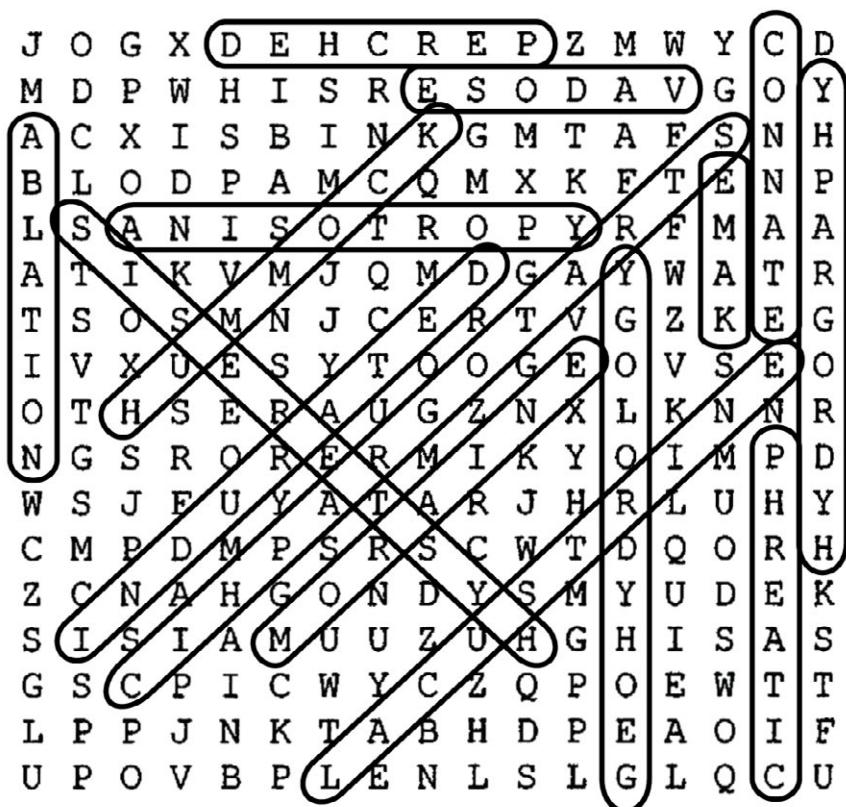
Military Lingo Infiltrating the MGWA Newsletter?

Sharp-eyed reader and long-time MGWA member Tim Thurnblad, a Senior Hydrologist with the Minnesota Pollution Control Agency, spotted an interesting typographical error in the Hydrogeology WordFind that appeared in the June issue. The word "stratigraphic" was misspelled as "stratographic" which is defined as "a description of an army, or what belongs to an army", certainly not the intended definition, "pertaining to the origin, composition, distribution, and succession of strata." By way of explanation, the puzzle was developed with a software package available on-line using a pre-developed word list. Because "stratographic" is a word, the WordFind software gladly accepted it, never minding that it wasn't a geologic term. No one on your editorial team caught the goof. Thanks, Tim, for bringing this to our attention. The solution to the puzzle as it was originally published in the June issue appears below, although note that correcting the spelling of "stratigraphic" doesn't change the solution.

Email your answer and your "two cents worth" to: editor@mgwa.org

Answer to the June '07 Question of the Quarter

Hydrogeology WordFind



LEGISLATIVE OUTCOMES

Clean Water Legacy Act Funding is Good News for Ground and Surface Water Protection Efforts in Minnesota

Before the Minnesota Legislature adjourned in May, they passed the comprehensive Clean Water Legacy Act and supported it with funding to provide for long-term monitoring, assessment and policy development to protect Minnesota's priceless water resources. The Minnesota Pollution Control Agency (MPCA) received \$18 million for continuing development of Total Maximum Daily Load (TMDL) allocations. An additional \$12.6 million was designated for assessment of the state's surface water quality and trends. MPCA also received \$375,000 for endocrine disruptor monitoring and an additional \$88,000 for a one-time report on strategies to address this issue. MPCA received an additional \$6 million for added staff and resources to expedite permitting in the expanding ethanol and mining sectors.

The Legislature authorized the transfer of \$600,000 from the MPCA's Remediation Fund to the Minnesota Department of Health (MDH) to evaluate point-of-use water treatment units for removing perfluorochemicals (PFCs) from drinking water. In addition, MDH is to receive \$1.8 million for environmental public health tracking and biomonitoring.

In 2008, a bonding year, MPCA intends to seek new money for remediation in the closed landfill program, increases in water quality loans administered by the Public Facilities Authority and

more funding for capital grants to local governments for construction of solid waste resource recovery facilities, hopefully keeping more waste out of landfills.

At the Minnesota Department of Natural Resources (DNR), the Clean Water Legacy Act funding will provide an important step forward toward protection and management of Minnesota's waters. DNR received new Clean Water Legacy funding of \$2,250,000, one time. This will allow DNR to add additional stream gaging staff, continue and augment lakeshed mapping, and fund other positions for shoreland stewardship and surface water hydrology. This funding helps support the DNR-MPCA cooperative monitoring programs.

In addition, the legislative session provided \$500,000, one time, to add staff in response to increased workloads related to ethanol site permitting, monitoring, and technical analysis. In a related statutory change, new language provides a means to recover some costs associated with the extensive review and analysis that is required for very large appropriators (in excess of 100 million gallons per year) locating facilities in areas that are relatively short of water. Additional funding was also received to support DNR priority work in shoreland and surface water management.

MDH Health Risk Limits for Groundwater: 2007 Rules Revision Update

By Paul Moyer, Minnesota Department of Health

Advancing science, evolving health-protective priorities, and emerging contaminants all underscore the efforts underway by the Health Risk Assessment Unit of the Minnesota Department of Health (MDH) to revise the Health Risk Limits (HRLs). HRLs are health-protective values for concentrations of contaminants that have been found in Minnesota's groundwater. MDH develops and promulgates HRLs for groundwater contaminants in accordance with the Groundwater Protection Act of 1989 (Minnesota Statutes, sections 103H.001 et seq.). MDH first promulgated HRLs in 1993 and 1994. The MDH is now proposing a major revision of the HRL rules. The proposed rule changes are necessary because of detection of additional groundwater contaminants, developments in toxicological research and in risk assessment guidelines, and provisions in the 2001 Health Standards Statute (Minnesota Statutes, section 144.0751) as well as other mandates by the Minnesota legislature all of which have implications for the HRL revision process and in turn Minnesota's groundwater.

In the spring of 2007 the Minnesota legislature passed Minnesota Session Laws – 2007: Chapter 147, Article 17, Section 2 known as the Water Level Standards. Among the provisions of this legislation is the directive for MDH to adopt by reference the U. S. Environmental Protection Agency's (EPA) Maximum Contaminant Level (MCL) value as the HRL for those groundwater contaminants when the MCL is more stringent (lower) than the current 93/94 HRL value. This change will affect 11 chemicals. The new MCL-based HRLs will remain in effect until such time that each of these chemicals is taken through the HRL rule mak-

ing process. It should be noted that the calculation of new HRL values following scientific review and using current risk assessment methodology may yield limits that are lower, equal to, or higher than the current MCL value. For more information please see: www.health.state.mn.us/divs/eh/groundwater/hrlgw/waterlevelstandards.html.

Other provisions of the Water Level Standards include the requirement for MDH to publish a notice of intent to adopt HRLs for commonly detected contaminants by March 1, 2008, and to adopt HRLs for the ten most commonly detected contaminants by March 1, 2009. MDH has begun discussions about these directives, and will comply with the stipulations within the time frames established. Because no criteria are denoted in the legislation regarding the top ten commonly detected contaminants, MDH is considering how best to establish this contaminant list. Initial MDH efforts will include the collection of relevant information from groups within MDH's Drinking Water Protection Section, as well as from program staff at the Minnesota Department of Agriculture and Minnesota Pollution Control Agency.

The final provision of the Water Level Standards legislation requires that a report be made to the Minnesota legislature regarding the implications for public health and the costs involved to enforce the use of HRL values when they are more stringent than the current MCLs for public water supplies. The Environmental Health Division within MDH will work collaboratively in order to generate this report.

continued on next page

MDH Health Risk Limits for Ground Water, cont.

MDH-derived HRLs differ from existing federal regulations and advisory values in three ways. First, MDH-derived HRLs are strictly health-based. Second, MDH-derived HRLs provide guidance for both cancer and noncancer effects. Finally, calculation of the revised MDH-derived HRLs explicitly addresses infants and children, considered to potentially be at higher risk than adults. On the other hand, MCLs consider factors in addition to the public's health such as technical feasibility in achieving regulated levels and the related costs involved.

A second groundwater-related piece of legislation was also enacted during this past session. Minnesota Session Laws – 2007: Chapter 37 directed MDH to use “Good Cause Exemption” rule making procedures in amending the 93/94 HRL rules to include new HRL values for the two chemicals perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). As of August 27, 2007, the HRL for PFOS is 0.3 ug/L and the HRL for PFOA is 0.5 ug/L. As stipulated through the use of the “Good Cause Exemption”, these rules are only valid for two years or until these HRLs are incorporated into permanent rules. MDH intends to include PFOS and PFOA in the 2007 HRL rules revision. For additional information please see: www.health.state.mn.us/divs/eh/groundwater/perfluorohrls.html.

The draft 2007 HRL rules revision contains many changes to the policy and methodology applied in deriving these health-protective values compared to the 1993/1994 rules as well as the draft revision publicized in 2004. Some highlights of these changes include the derivation of both a cancer (cHRL) value and multi-

ple noncancer HRL (nHRL) values for a single chemical when the relevant scientific information is available. The nHRLs will be calculated for multiple durations of exposure as supported by the data. These durations are: acute (24 hours or less), short-term (1 to 30 days), longer-term (more than 30 days up to 10% of a lifetime), and chronic (more than 10% of a lifetime). Each of these durations will be paired with the appropriate time-weighted average water intake rate. In providing these multiple duration nHRL values, MDH is ensuring that sensitive life stages may be protected (e.g. acute duration considers developmental effects) as well as providing risk managers with health-protective values to apply to scenario-specific exposures.

Changes to the methodology for deriving cHRL values include the use of the EPA algorithm for early life exposure to carcinogens. Based on available scientific data as well as in keeping with the intent of the Health Standards Statute to protect infants, children, and adults, MDH will apply this algorithm as the default method for all carcinogens. MDH will defer to the use of chemical specific information as preferable over using this default approach whenever possible.

These changes were the subject of a public meeting held in April 2007, a summary of which is available on the MDH Health Risk Limits for Groundwater website: www.health.state.mn.us/divs/eh/groundwater/hrlgw/changes.html.

continued on next page



Got water?

Get Barr.

For more than 40 years, Barr's hydrogeologists and engineers have been helping clients with integrated water resources management. We work on some of the region's most challenging water supply, distribution, and treatment projects. Clients look to us for:

- Groundwater monitoring and modeling
- Distribution-system modeling
- Well siting, design, and construction
- Wellhead-protection plans

We're proud to support MGWA and to have been named four times as a Best Place to Work.*



Barr Engineering Company
1-800-632-BARR
www.barr.com
Minnesota • Michigan • Missouri

* Minneapolis/St. Paul Business Journal

MDH Health Risk Limits for Ground Water, cont.

As the 2007 HRL rules revision process continues, MDH envisions the following time-line:

- ◆ In early September a draft version of the Rules and SONAR will be posted on the HRL website for public review
- ◆ In mid and late September public meetings will be held to present information and have discussions about various aspects of the proposed Rules and SONAR.
- ◆ Into October HRL values for chemicals will continue to be added to the rules.
- ◆ In mid to late November a proposal to promulgate the revised HRL rules will be published in the state register which will begin the formal comment period.

An important point to emphasize concerns the disposition of the 1993/1994 HRL values once the 2007 HRL rules revision goes into effect. The 2007 HRL rules will replace the 1993/1994 rules, and subsequently the existing table of values will be replaced by a smaller number of chemicals. MDH is considering a plan whereby the 1993/1994 MDH-derived HRL values can be designated as Health Based Values (HBVs). An HBV chemical would remain at this designation until MDH takes it through the HRL rule making process.

Up until this time, the focus of the rules revision effort has been concentrated mostly on reviewing the literature for risk assessment practices, policies, and guidelines in order to include the

best methodology and algorithms to use in deriving these health-protective values. Effort has also been made to ensure a consistent and systematic collection and application of chemical specific information. These chemical reviews have been conducted in order to make certain that the most current scientific information available is used when deriving values for HRL candidate chemicals. The current projection is that MDH will derive HRL values for approximately 10 to 15 chemicals within this round of rules revision.

MDH has and will continue to solicit input from partners, stakeholders, and risk managers regarding priorities for chemicals to include in this round as well as in future rounds of HRL rules revisions. MDH plans to conduct chemical reviews and amend the 2007 HRL rules annually over the next few years to increase the number of chemicals for which HRL values have been derived to a level sufficient to meet the public health needs of the risk managers within Minnesota. MDH invites all interested parties to provide comments on any of the proposed policies and scientific approaches, and to supply any chemical specific information for use in deriving HRL for candidate chemicals. For more information about the HRL rules revision process including how to contact MDH or how to receive e-mail notifications of changes to the draft rules revision, please see:

www.health.state.mn.us/divs/eh/groundwater/hrlgw/index.html.



Sales – Account Executive

Pace Analytical Services, Inc., the second largest environmental laboratory organization in the United States, is seeking a sales representative for its environmental laboratory located in Minnesota. Pace Analytical is a privately held, profitable and growing company. This position represents a significant sales career opportunity.

Preferred Qualifications:

The ideal candidate will have 5 to 7 years experience in environmental consulting or environmental laboratory sales with emphasis on the following: on-site investigation and remediation, UST projects or industrial emissions monitoring, wastewater and air monitoring – and knowledge of the local regulatory environment. Successful direct sales experience or strong sales aptitude and the ability to build lasting client relationships is a must. Emphasis on pertinent industry experience and knowledge is vital to this position.

The reimbursement plan for this position includes:

Base salary plus commission, car allowance, company expense account and a comprehensive benefits package. For additional information, visit: www.pacelabs.com.

Qualified individuals should submit a cover letter and resume with salary requirements to:

Michael King
Regional Sales Manager
Pace Analytical Services, Inc.
1700 Elm Street, Suite 200 • Minneapolis, MN 55414
mking@pacelabs.com • (317) 774-9068

LMIC's Budget Restored

On May 25, 2007, Governor Pawlenty signed the State Government Finance bill (HF548) that includes restoring base funding for the Land Management Information Center. It provides \$889,000 for FY08 and \$895,000 for FY09, which is a slight increase over LMIC's FY07 budget. It also indicates that the funding should remain at this level for the following two years.

LMIC serves Minnesota by helping other government and non-government organizations achieve better, faster, and more cost-effective results for the state through the creative use of GIS and other geospatial information technologies. LMIC provides GIS coordination, data services, mapping services, and consulting.

The Land Management Information Center is also a portal to a wide variety of GIS data, tools, and services. Go to www.lmic.state.mn.us/ and check out the latest available GIS data sets, tools, and resources.



TRAINING OPPORTUNITIES

MGWA's 25th Anniversary Conference - the First 'Don't Miss Event' of this Century

The Fall 2007 Conference, "Addressing Ground-Water Issues for the Next Generation", will be a combination of history, current state-of-the-science, visionary discussion, and celebration of accomplishments of our 25-year existence as an Association of people interested in Minnesota ground water.

- ◆ Conference presenters will provide insights from past research and work with a chance to provide their visions about what the future may hold.
- ◆ Several of the presentations will include a brief description of past articles published in the MGWA newsletter and comments on where that state of the science is today and predictions about that aspect of ground-water science for the next 25 years.
- ◆ Audience participation through panel discussions, particularly about future speculations, will be encouraged.
- ◆ Discussions also will be boosted by a keynote futurist, Jack Bacon, who will give his perspective about science information into the next generation.
- ◆ The results of this conference should benefit technical practitioners, students, managers and policy makers planning to chart the future of ground water in Minnesota.

Mark your calendars (November 13) for a day of stimulating conversation and an evening of celebration.



Jack Bacon will speak at the 25th Anniversary Conference.

Jack Bacon has often been called "A New Carl Sagan." He is an internationally-known motivational speaker, a distinguished lecturer (emeritus) of the American Institute of Aeronautics and Astronautics (AIAA), and one of the most requested speakers in the country for topics concerning technology and the factors that shape human society. A noted futurist and a technological historian, he has written three popular books on the pace of technology and society. His lectures have captivated tens of thousands of all ages in thirty countries on six continents. In his daily work, he is on the management team overseeing the construction and operation of the most complicated technical project in history: the International Space Station.

Register Now For WGWA Fall Field Trips

By Lee Trotta, Wisconsin Ground Water Association

The Wisconsin Ground Water Association fall field trips October 5 and 6, start and end at the front door of the Grand Harbor Resort on 350 Bell Street in Dubuque, Iowa. See www.grandharborresort.com for a map. A group rate of \$109 per room is available, which includes admission to the indoor water park.

A registration form is on the WGWA website at www.wgwa.org/events.html. Registration can be for just Friday, just Saturday, or both.

On Friday (October 5th), you have the chance to visit legendary Spook Cave and the largest spring in Iowa, which also doubles as a trout hatchery. An evening banquet will be at the Grand River Center.



Spook Cave Entrance

On Saturday (October 6th), Bruce Brown and James Knox will lead the group to outstanding outcrops, trout streams, and alluvial deposits in southwestern Wisconsin. The trip will also visit historic St. John's Mine where the equipment can be viewed and the historic mining processes will be explained. It will be possible for field trip participants to collect samples from the mine to take home. Dr. Bruce Brown will explain how the mineral deposits were formed and relate the geology to outcrops in the vicinity.



Sales Manager

Pace Analytical Services, Inc., the second largest environmental laboratory organization in the United States, is seeking a Sales Manager for its environmental laboratory located in Minnesota. Pace Analytical is a privately held, profitable and growing company. This position represents a significant sales leadership opportunity.

Preferred Qualifications:

The ideal candidate will have 7 to 10 years experience in environmental consulting or environmental laboratory sales with emphasis on the following: on-site investigation/remediation, UST projects or industrial emissions monitoring, wastewater and air monitoring – and knowledge of the local regulatory environment. Successful direct sales or sales management experience and strong sales aptitude with the ability to build lasting client relationships is a must. Key management criteria must include pertinent industry experience, ability to energize senior-tenured salespeople and a compelling track record of sales growth and territory management.

The reimbursement plan for this position includes:

Base salary plus commission, car allowance, company expense account, and a comprehensive benefits package.

Qualified individuals should submit a cover letter and resume with salary requirements to:

Michael King
Regional Sales Manager
Pace Analytical Services, Inc.
1700 Elm Street, Suite 200 • Minneapolis, MN 55414
mking@pacelabs.com • (317) 774-9068

CALENDAR

Regional and Local Events

October 5-6, 2007

Wisconsin Ground Water Association Fall Field Trips, Grand Harbour Resort in Dubuque, Iowa Information: www.wgwa.org/falltrip.html

October 23-24, 2007

Minnesota Water Resources Conference, Earle Brown Heritage Center, Brooklyn Center, Information: wrc.umn.edu/waterconf

October 29-31, 2007

52nd Annual Midwest Ground Water Conference, Sheraton Hotel & Convention Center Sioux Falls, South Dakota
Website: wri.sdstate.edu/esdwc/

November 13, 2007

MGWA Fall Conference and 25th Anniversary Celebration: Addressing Ground-Water Issues for the Next Generation
Continuing Education and Conference Center
University of Minnesota, St Paul Campus
Information will be posted at:
www.mgwa.org/meetings/index.html

There's no substitute for experience

- Ground-Water Exploration
- Wellhead/Source Water Protection
- Vulnerability Assessments
- Ground-Water Modeling
- Well Field Management
- Ground-Water/Surface-Water Assessments & Permitting
- Environmental Investigation
- Remediation Engineering
- Risk Assessments
- Environmental Risk Transfer
- Vapor Intrusion Evaluation



Leggette, Brashears & Graham, Inc.
Professional Ground-Water and Environmental Engineering Services
Established in 1944

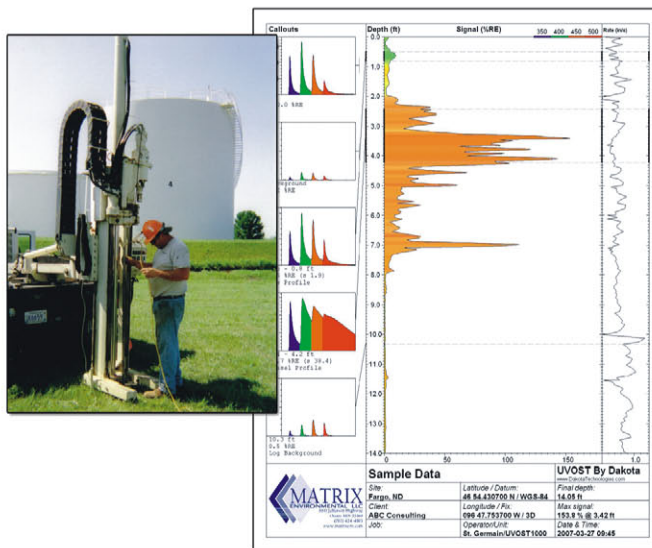
8 Pine Tree Drive, Suite 250 | St. Paul, MN 55112
651.490.1405

Offices Nationwide | toll free: 877-959-7800 | www.lbgweb.com



Environmental Field Services

- ◆ **Geoprobe®**
4x4 Trucks, All-Terrain Vehicles & Portable Units
- ◆ **Mobile Lab**
VOCs, Hydrocarbons, PCBs, PCP, PAHs & Metals
- ◆ **Direct Sensing**
UVOST - Laser Induced Fluorescence, Membrane Interface Probe (MIP), Electrical Conductivity Logging
- ◆ **Remediation**
Bioremediation, In-situ Chemical Oxidation, Stabilization



Our ultra-violet optical screening tool (UVOST) is specifically designed for delineating the NAPL found at Petroleum, Oil, Lubricant (POL) sites. UVOST can be deployed by all forms of direct push across a wide range of site conditions.

Matrix MN Office
8631 Jefferson Highway
Osseo, MN 55369
(763) 424-4803
Fax: (763) 424-9452

MATRIX ENVIRONMENTAL LLC
www.matrixenv.com
email: customerservice@matrixenv.com

OH Office
P.O. Box 364
Galena, OH 43021
(740) 965-8271
Fax: (740) 965-8037

Guidelines for Submission of Newsletter Articles

The newsletter team appreciates the efforts of article contributors, without whom our newsletter would not be possible. To make the process easier on the author, the newsletter team and production staff, we have established some guidelines we would like authors to follow. For a complete list of guidelines, please see the MGWA web site:

- ◆ Submittals should be complete and ready for publication.
- ◆ The text of the article should be submitted as a Microsoft Word document in an attachment to an e-mail or on disk.
- ◆ Tables, captions, figures and graphics should be submitted as separate high quality files.
- ◆ A version of the article with embedded tables, figures, and graphics may be submitted as an additional file to indicate the preferred layout of the tables, figures and graphics within the article.
- ◆ The contributor should include the contributor's name and affiliation following "By" below the title of the article.
- ◆ The contributor should secure permission to print or reprint if applicable and provide the required text to be included with the article.
- ◆ Materials should be submitted before the deadline.
- ◆ If there is any question about the suitability of a proposed article's content for the MGWA newsletter, it is advisable for the contributor to call the editor before investing significant time in article preparation.

Share your knowledge!

Submit a newsletter article!

MGWA 2008 Newsletter Advertising Policy

Advertising Rates to Increase in MGWA Newsletter

The MGWA Board has voted to increase advertising rates for display ads in the MGWA Newsletter beginning with the March 2008 issue. The increase is due to increasing costs for the production and publication of the newsletter. The new rates are for four issues and will be as indicated below. Advertisers provide significant support in the publication of this newsletter. With their support we are able to produce a higher quality newsletter of which we can all be proud. The MGWA Board has also voted to increase advertising rates in the MGWA Directory as indicated below.

Display ads:

Size	Inches Horiz. x Vert.	Quarterly Newsletter 4 issues	Membership Directory 2 issues
Business Card	3.5 x 2.3 or 1.9 x 3.5	\$100	\$50
Quarter Page	3.5 x 4.8 or 5.4 x 3.5	\$150	\$100
Half Page	7.5 x 4.8	\$250	\$200
Full Page	7.5 x 9.75	\$500	\$400
Inside Cover	7.5 x 9.75	not available	\$500

Many thanks for the support of MGWA newsletter advertisers

There are no commissions on ads. Advertising copy must be received by the publication deadlines as published in the newsletter. Advertisers should submit material as a digital file in TIFF, GIF, JPEG or PCX format at 300 to 600 dpi.

Please make checks payable to "Minnesota Ground Water Association" or "MGWA." Direct your orders and questions concerning advertising rates to Jim Aiken, Advertising Manager, c/o MGWA, 4779 126th Street, White Bear Lake MN 55110-5910; (952)832-2740; jaiken@barr.com. The complete advertising policy is available on the MGWA web site at www.mgwa.orgnewsletter/adrates.html. Questions concerning advertising policy should be directed to the MGWA President: Jeff Stoner; (763)783-3106; stoner@usgs.gov.

Join the Minnesota Ground Water Association!

If you are reading this newsletter secondhand, we'd like to take this opportunity to invite you to become a member of MGWA for 2008. Annual dues are \$30 for professional members and \$15 for students (for corporate membership, see www.mgwa.org).

Members receive e-mail notice of the availability of the quarterly newsletter for downloading from the MGWA web site. If desired, members may subscribe to a printed edition of the newsletter (4 issues for \$10).

Members are also entitled to purchase a paper copy of the annual membership directory for \$7; an electronic version will be available on the website for paid members.

Tax deductible contributions to the MGWA Foundation scholarship fund 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.

Just complete the form below and mail to: MGWA, c/o WRI, 4779 126th St. N, White Bear Lake, MN 55110-5910 or visit our web page and join on-line at www.mgwa.org.

Name _____
Affiliation/Employer _____
Work Address _____
Work City, State, Zip Code _____
Work Telephone Number _____
E-mail Address _____
Fax Number _____
Home Address _____
Home City, State, Zip Code _____
Home Telephone Number _____
Which Address should we use for Mailings? Directory Listing? _____
Which Telephone Number should we use for Directory Listing? _____



LIESCH ASSOCIATES, INC.

A FULL SERVICE ENVIRONMENTAL CONSULTING FIRM

Please contact Jim de Lambert at 800-338-7914 concerning:

- Water Supply Exploration, Development and Protection
- Phase I & II Environmental Site Assessment Services
- Environmental Compliance Assessments
- Soil and Groundwater Remediation
- Underground Storage Tank Investigation and Remediation
- Asbestos Assessment and Management
- Industrial Hygiene Services



Hydrogeologists • Engineers • Environmental Scientists

13400 15th Avenue N
Minneapolis, MN 55441
(763) 489-3100

6000 Gisholt Dr, Suite 203
Madison, WI 53713
(608) 223-1532

4300 N Miller Rd, Suite 200
Scottsdale, AZ 85251
(480) 421-0853

Visit us on the web at www.liesch.com

MGWA Foundation Board of Directors

President

Gil Gabanski
GJG Environmental
Consultants
(763)550-3982
ggabanski@hotmail.com

Secretary

Cathy Villas-Horns
Minnesota Department of
Agriculture
(651)297-5293
cathy.villas-horns@state.mn.us

Treasurer

David Liverseed
Opus Corporation
(952)351-6003
david.liverseed@opuscorp.com

MGWA Liaison

Dale Setterholm
Minnesota Geological Survey
(612)627-4780 x223
sette001@umn.edu

Director

Chris Elvrum
Metropolitan Council
(651)602-1066
christopher.elvrum@metc.state.mn.us

Director

Amanda Goebel
Washington County
(651)430-6655
Fax: (651)430-6730
goebel@co.washington.mn.us

**MGWA Foundation
Grant Request Deadlines
are quarterly:**
March 1
June 1
September 1
December 1

MGWA FOUNDATION NEWS

University of Wisconsin-Parkside Field Trip to the Mississippi River Corridor.

By Zoe McNanama

On April 27-29, seventeen geosciences students and two professors from UW-Parkside in Kenosha, Wisconsin attended the MGWA-supported three-day field trip to the Mississippi River corridor. The purpose of the field trip was to view the geological features of the aquifers and confining units across southern Wisconsin, and to gain a better understanding of ground water behavior and capacities in these rocks. The group was treated to a comprehensive explanation of the technical aspects of municipal wells, including well siting and well development in Prairie du Chien and the surrounding areas, by Del Maag from Wisconsin Department of Natural Resources, and Larry Gates from Prairie du Chien Water Department. The group was able to view a working municipal well and hear about water quality and treatment issues in the region, and then to see the formations to which individual challenges pertained.

The field trip was a great success, and both the students and professors would like to thank MGWA for their support. It was a thrill to be able to see outcrops of the rocks that are buried under glacial till in southeastern Wisconsin, and to finally be able to investigate the sandstone and carbonate rocks from which our groundwater has its source.



*Geosciences students
and faculty from the
University of
Wisconsin-Parkside at
Pikes Peak State Park,
Iowa*

Outdoor Ground Water Display Opens at Science Museum of Minnesota

After three years in planning, the Ground Water Exhibit at the Science Museum of Minnesota's Big Back Yard is open. This exhibit is a first-of-its-kind outdoor display about ground water featuring:

- ◆ One deep water well
- ◆ Two hand pumps
- ◆ Two large rocks with different porosities
- ◆ Display panels about ground water
- ◆ Buckets to haul water

Bring the kids, the family, and get wet.

The Big Back Yard is currently open on weekends through October 7.



Minnesota Ground Water Association Foundation Board Meeting Minutes

Meeting Date:	Tuesday, June 12, 2007
Location:	Washington County Offices, Stillwater
From:	Cathy Villas-Horns (Secretary)
Members Present:	David Liverseed, Gilbert Gabanski, Amanda Goebel, Christopher Elvrum, and Cathy Villas-Horns
Agenda items:	MGWA Management Present: Jeanette Leete and Sean Hunt Review of Minutes, Treasurers Report, Old Business, New Business, Next Meeting (Date and Place). Gil called the meeting to order.
Review of Minutes	The meeting minutes for the March 16, 2007 meeting were approved via e-mail on May 8, 2007. In the future the draft minutes will be e-mailed to the MGWAF Board within a week of the meeting and board members will have five (5) working days to review and provide comments on the minutes. Minutes will be approved via e-mail so that the minutes can be provided in a timely manner to the newsletter committee.
Treasurer's Report	Foundation balance to date is \$76,154.42. The MGWAF Quarterly Financial Report was provided at the meeting by Dave. Total donations received from the MGWA membership since 3/16/07 were \$420. Interest in the amount of \$745.56 was accrued since 3/16/07. This interest was swept into the endowment. The MGWAF also received \$9500 from the MGWA for the endowment. Discussion ensued on the policy of MGWA donations to the MGWAF. A motion was made by Dave and seconded by Gil to roll the CD maturing in July 2007 (\$5162.37) into the CD currently at 5.271%. Motion passed. A motion was made by Dave and seconded by Chris to place the \$9500 donation from MGWA into the CD currently at 5.271%. Motion passed.
Old Business	<u>SMM Ground Water Display</u> – The SMM committee has been reviewing the educational panels that will accompany the ground water exhibit. The exhibit area is paved, the large rock specimens are in place, and other portions of the exhibit are nearly ready. The sand tank model may not be ready when the exhibit opens within a few weeks; however, the water table model is ready. <u>State Fair Exhibit on Ground Water</u> - Gil was contacted by the MPCA which is including ground water in their exhibit for the MN State Fair. <u>Fall Meeting 2007</u> – The MGWA Board is planning a reception and dinner immediately after the fall conference to celebrate the 25th anniversary of the founding of the MGWA. The MGWA December newsletter will be a special 25th anniversary edition. <u>Bylaws Update</u> – The bylaws are still undergoing revision by the bylaws committee, which has not met.
New Business	Grant Request – A request for \$1000 for the 2007 Children's Water Festival was received from the Joseph Enfield of Carver County. Motion was made by Cathy to approve, seconded by Dave. Motion passed. SMM Youth and Volunteer Training – Amanda was unable to provide training on ground water to the SMM staff and volunteers who will be staffing the ground water exhibit in the Big Backyard this summer. Amanda will not be volunteering at the SMM this summer. SMM GW Display Opening – Possible announcements may include an e-mail to the MGWA membership, colleges on our contact list, LCCMR legislators, NGWA and local media outlets. Discussion of a possible open house at the Big Backyard when the ground water exhibit opens. MGWA Foundation website – Chris offered to update the text files on the website. Information filed with the IRS when the MGWAF was founded includes this statement: "MGWAF serves Minnesota plus adjoining US states and Canadian provinces." Therefore, MGWAF grants should be restricted to MN, WI, IA, SD, ND, Manitoba and Ontario.
Next Meeting	The next meeting will be September 11, 2007 at 11:30 AM at the Fresh Grounds Coffee Shop on West 7th St. in St. Paul. Meeting adjourned.

The Initial Fundraising Goal for the Endowed Scholarship Fund is \$100,000.

MGWA BOARD MINUTES

Minnesota Ground Water Association Board Meeting Minutes Regular Monthly Meetings

The MGWA Board of Directors meets once a month.

All members are welcome to attend and observe.

Date:	May 16, 2007, 11:30 am
Location:	Keys Café, Lexington and Larpenteur, Roseville
Attending:	Jeff Stoner, President; Dale Setterholm, Past President; Stu Grubb, President-Elect; Craig Kurtz, Treasurer; Norm Mofjeld, Editor; Jim Aiken, Advertising Manager; Jeanette Leete, WRI; Sean Hunt, WRI.
Reports:	
Treasury	2006 Financial Audit completed Motion to move the net income (approximately \$9,550) from 2006 to the MGWA Foundation-Endowment approved
Membership	Most renewals are in, regular membership at 610, student membership at 21. Fall conference renewals will be recorded as 2008 members.
Web Page	There were several days of downtime during which an update of our web content that contained outdated material appeared on our site due to a problem at our web host; corrected.
Foundation	Has not met since last Board meeting. The MGWAF board will meet on June 12, 2007.
Newsletter	Kurt Schroeder is the editor of the current edition. Most content is in the editor's hands. The ethanol article planned for this issue will appear in the next issue instead.
Old Business:	<u>25th Anniversary Publication</u> The last newsletter of this calendar year will be a special edition commemorating the 25th year of the MGWA. It will contain about 15 articles from past issues, and 10 new articles. The trend in ground water topics over the years will be featured. Lists of charter members and all officers will be included. This special edition will be handed out to Fall Conference attendees and also distributed via the website. Corporate sponsorship and special advertising opportunities will be solicited by Jim Aiken and he will report to the Board at the next meeting. <u>Spring Conference</u> comment forms from the meeting were nearly all positive. Some suggestions for future topics were made but there was no clear favorite. <u>Fall Field Trip</u> Stu Grubb is working with the Freshwater Society to develop a field trip in conjunction with an ethanol conference. The date has been moved to September.
New Business:	WGWA field trip will be advertised by MGWA. Most stops are in Iowa. Minnesota Environmental Initiative is planning a forum on water sustainability for the morning of Wed., June 20. President Stoner is soliciting ideas for a theme for the Fall Conference, and for a dinner speaker. Board approved purchasing a 3 year maintenance agreement on the MGWA laptop. WRI reports will be included on the regular agenda going forward.
Next Meeting:	June 13, 2007, same time and venue. Meeting adjourned.

Date:	June 13, 2007, 11:30 am
Location:	Keys Café, Lexington and Larpenteur, Roseville
Attending:	Jeff Stoner, President; Dale Setterholm, Past President; Stu Grubb, President Elect; Craig Kurtz, Treasurer; Jon Pollock, Secretary; Norm Mofjeld, Newsletter Editor Sean Hunt, WRI; Jennie Leete, WRI

Send your comments to editor@mgwa.org

Reports:	
Past Minutes	The May 16, 2007 minutes were approved as amended.
Treasury	Net income is 9644.93 this year. The taxes have been completed. \$9500.00 transferred to MGWA Foundation
Membership	610 regular members and 21 student members.
Web Page	Tax files posted. Sent out field trip announcements for Wisconsin's field trip. Posted directory.
Foundation	MGWA Foundation received \$9500.00 from MGWA. Approval of \$1000.00 for Children's Water Festival. Minnesota Science Museum display being worked on and should be in place for July opening. Foundation interested in PR for display.
Newsletter	Discussion of current edition. September issue items discussed. Newsletter and directory advertising rate changes discussed. Also discussed rate changes to directory. Newsletter editor will draft proposed newsletter and membership advertising rate changes.
WRI Report	Report handed out detailing activities completed since last meeting including work on the directory, year end reports, newsletter, and MGWA Foundation activities.
Old Business:	MGWA 25th Anniversary Publication: The last newsletter of this calendar year will be a special edition commemorating the 25th year of the MGWA. Looking at 5 categories related to the trend in ground water topics over the years. Fall Field Trip: Visit to Alcorn ethanol plant located approximately 15 miles east of Owatonna in Mid September. Still trying to contact a near-by second plant to visit

Minnesota Ground Water Association Board Meeting Minutes, cont.

	<p>with a different process. MGWA and Freshwater Society to work together to divide up responsibilities. Freshwater Society to meet this month and determine if the conference will be going forward.</p> <p>Fall Conference: Draft outline handed out by the President. Showed possible topics for fall conference: Conceptual Frameworks, Tools and Datasets, Natural Contaminants and Monitoring, Policies and Programs, and Remediation. WRI will email charter member list to the MGWA Board.</p> <p>MEI: MGWA participating in MEI forum on water sustainability. Past President will talk about emerging groundwater issues and where we are. President Elect has not been contacted.</p>
New Business	<p>Minnesota Science Museum: Jeff wrote letter of support to Science Museum, a copy of which was given to Jennie.</p> <p>MEP: Laurel Reeves at MEP meeting. Proposal to provide input from MGWA to LCCMR</p>
Next Meeting	July 25, 2007 at 1130 at Keys Café at Lexington and Larpenteur in Roseville. Meeting adjourned at 12:58pm.
Meeting Date	7/25/07
Place	Keys Café, Lexington and Larpenteur in Roseville, Minnesota
Attending	Jeff Stoner, President; Dale Setterholm, Past President; Stu Grubb, President Elect; Jon Pollock, Secretary; Norm Mofjeld, Newsletter Editor; Sean Hunt, WRI
Reports:	
Treasury	WRI reported that they updated IRS filings. Compliance audit from State for 2004, 2005, and 2006. State will be looking at federal forms.
Membership	No report
Web Page	Update MGWA Foundation page, web hosting fees coming due – will be just under \$100.00.
Foundation	Has not met.
Newsletter	Discussion of items needed from MGWA Board Members for September issue. Discussion of new advertising rates for newsletter. WRI will get back to us on rates for directory advertising. Will need to get rates set by August meeting.
WRI Report	Report handed out detailing activities completed since last meeting including: Scanning MGWAF IRS filings, NGWA relationship with MGWA, Updating directory, charter membership list updated, advertising rates, work on getting the MGWA 25 th Anniversary issue printed, notice of random audit, backup of financial data, receive late payment from MDH for conference along with late fees.
Old Business	<p><u>MGWA 25th Anniversary Publication:</u> The last newsletter of this calendar year will be a special edition commemorating the 25th year of the MGWA. Handout of draft contents for volume. Looking at 5 categories related to the trend in ground water topics over the years. Discussion of various topics. Deadline for 25th Anniversary Issue is September 7, 2007.</p> <p><u>Fall Field Trip:</u> October 9th at Uof M St. Paul campus auditorium. Speakers not yet decided on. Full day field trip October 10th - visit to Alcorn ethanol plant located approximately 15 miles east of Owatonna. Still looking for nearby plant with different process. Members will be able to attend either the conference and or the field trip. No title for conference yet. Unclear at this point to what extent MGWA will be involved in field trip logistics. Planning on approximately 100 people to attend conference.</p> <p><u>Fall Conference:</u> Rough draft of handout provided by President. Working on filling afternoon. Looking for input.</p> <p><u>MEI:</u> Dale Setterholm and Laurel Reeves participated in MEI forum on water sustainability. Dale spoke on groundwater sustainability and Laurel spoke on appropriations process. Approximately 150 people present.</p>
New Business	<p><u>Minnesota Association of Watershed Districts:</u> Tim Thurnblad contacted by MAWD indicating that MAWD was interested in working closer with MGWA in the future. MGWA President will contact them.</p> <p><u>MEP:</u> Laurel Reeves attended MEP meeting.</p>
Next Meeting	August 29, 2007 at 1130 at Keys Café at Lexington and Larpenteur in Roseville. Meeting adjourned at 1330.

Members can access the current year's newsletters in the 'Members Only' area of the web page.

The user name is mgwa and the password is emailed to members with each announcement of newsletter availability.

Minnesota Ground Water Association Board Meeting Minutes, cont.

Meeting Date	8/29/07
Place	Snuffy's, Malt Shop Lexington and Larpenteur in Roseville, Minnesota
Attending	Jeff Stoner, President; Dale Setterholm, Past President; Stu Grubb, President Elect; Craig Kurtz, Treasurer; Jon Pollock, Secretary; Norm Mofjeld, Newsletter Editor; Sean Hunt, WRI; Gil Gabanski, MGWA Foundation.
Agenda	Meeting called to order at 11:48. No additions to agenda.
Past Minutes	The July 25, 2007 minutes were approved as written.
Treasury	As of July 14, 2007 checking/savings balance of \$26,050.16. Net income of \$9553.62. Minnesota Revenue audit for 2004, 2005, and 2006 indicates MGWA owes Minnesota Revenue \$1794.12 (amounts rounded to nearest dollar include back taxes of \$1615.00, penalty of \$42.00 and interest of \$137.00). The back taxes are being collected because MGWA did not pay use tax on an internet purchase of printer cartridges from out of state, because the University Conference Center did not charge sales tax for facility rental and catering, and because WRI did not charge sales tax on photocopies. WRI will ensure that the annual sales tax return for 2007 that is due in February 2008 includes use tax and that vendors within Minnesota know to charge sales tax. Motion was made and approved by the Board to pay back taxes, penalty and interest. On August 12, 2007, MGWA received a letter from the IRS dated August 1, 2007, claiming the 2006 Form 990 and 990-T were not properly signed by an Officer. The letter states that MGWA has 30 days from the date of the notice to respond (MGWA interprets this date as August 31, 2007). MGWA Treasurer faxed a response letter and signature page to IRS on August 21, 2007. MGWA received another letter from the IRS dated August 20, 2007, requesting a \$420.00 penalty for the late filing of 2006 Forms 990 and 990-T. The treasurer drafted a letter dated August 30, 2007 requesting that the penalty for late filing be removed. A copy of the letter was distributed to those present at the Board meeting. Motion to submit request for removal of IRS penalty letter dated August 30, 2007 to the IRS was approved.
Membership	No report
Web Page	Employment advertisement for SEH added to web page. E-mails concerning Wisconsin Fall Field Trip, Children's Water Festival, and MPCA at the state fair were sent out. E-mails concerning the Science Museum display, Fox 9 Women of Science request for volunteers, and the Midwest Groundwater Conference are about to be sent out. Discussion of earlier email sent out regarding employment opportunities with DNR. Board expanded its earlier decision that employment opportunities from for-profit entities shall not be sent to members via email to include non-profit entities. Such opportunities can be posted on the MGWA website, but may not be emailed to members. Will meet September 11, 2007. Sponsored Children's Water Festival last June. Discussion of articles for fall issue. Newsletter will have notice of the Science Museum groundwater exhibit.
Foundation Newsletter	Report handed out detailing activities completed since last meeting.
WRI Report	<u>MGWA 25th Anniversary Publication:</u> Draft cover for issue was distributed to those present at the Board meeting. Two sponsors so far. Advertising Manager has made contact with several other potential sponsors. Two articles received thus far. Deadline for 25th Anniversary Issue is September 7, 2007.
Old Business	<u>Advertising:</u> Advertising Manager wants to drop the highest category of corporate membership since no one has ever signed up for this type of membership. WRI will pull together information on corporate rates for next meeting. <u>Fall Field Trip:</u> President Elect noted that the field trip, if it occurs, will need to be postponed to November/December. Discussion of perhaps picking this topic (ethanol) with the Freshwater Society for the MGWA Spring Conference. <u>Minnesota Association of Watershed Districts:</u> President tried to contact them. President Elect did talk with them and recommended postponing to next meeting. MAWD staffed with volunteers. MGWA should think of good ways to interact with other organizations. MGWA speakers bureau with some type of reimbursement? Stu will talk further with this group and will attend the annual conference at the end of November as a MGWA representative. <u>Conference Planning:</u> President looking into MGWA portfolio notebook at a cost of approximately \$10.00 for fall conference.
New Business	<u>NGWA:</u> Membership is \$250.00 per year. The benefits listed by NGWA include recruiting members, organizational lists, co-sponsorship of events, and leadership conference. President will write letter declining MGWA membership in NGWA.
Next Meeting	September 26, 2007, at 1130 at Keys Café at Lexington and Larpenteur in Roseville. Meeting adjourned at 1323.

**Don't forget:
Professional Geologist
license requirements
include continuing
education.**