

Minnesota Ground Water Association

www.mgwa.org

Newsletter

June 2011
Volume 30, Number 2

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MGWA President
Mindy Erickson

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President's Letter

Although it is barely summer, my mind already drifts to autumn: falling leaves, crisp sunshine, flavorful apples, and (of course!) GSA 2011.

MGWA will not be hosting a fall conference nor field trip this year. Rather, we encourage our members to attend the Geological Society of America's annual meeting. GSA will hold its annual meeting in Minneapolis from October 9 – 12, 2011. Field trips and short courses will be offered before, during, and after the technical program. GSA has not held its annual meeting in Minneapolis in decades, so this will be a rare and welcome opportunity for us to attend an important national meeting right here in our own backyard.

Because MGWA is now a GSA Associated Society, you, as an MGWA member, may register for GSA 2011 at member rates (www.geosociety.org/meetings/2011/) – a registration fee reduction of up to \$100 per MGWA member! As you know, we have a wide range of interesting and important groundwater projects happening in Minnesota, and GSA 2011 will be a chance to showcase our work and our active groundwater community. MGWA is sponsoring several technical sessions and field trips, which are discussed in more detail in the newsletter.

Two events will take place during GSA 2011 that are particularly meaningful to me. First, I will have the privilege of presenting Dr. Otto Strack with MGWA's Outstanding Service Award for his decades-long service to U of MN students, the groundwater community

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Subterranean Wonders of the Twin Cities

By Greg Brick

I have compiled a list of what I regard as the most important and unique subterranean features of the Minneapolis-St. Paul Metro area, whether they be natural, artificial, or "inadvertent" features. All of them still exist, though perhaps not as they were in their glory days. Grouped by threes for convenience, the following, describing three St. Paul caves, is the second of four articles in this "miniseries."

Carver's Cave. Native Americans refer to Carver's Cave as Wakan Tibi, the Dwelling of the Great Spirit. Jonathan Carver visited what he called the "Great Cave" in 1766 and again in 1767, describing its subterranean lake. It became the earliest Minnesota cave in the published literature when the first edition of Carver's best-selling *Travels Through the Interior Parts of North America* appeared in 1778. About 100 feet long, Carver's Cave is a spring-cut cave in the St. Peter Sandstone, formed by the erosion of sand grains by flowing water, a process known as piping. The Carver's Cave ecosystem, lacking photosynthetic inputs, is based on organic detritus, chiefly decaying leaves that have blown in through the cave entrance, providing food for amphipods



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Newsletter Deadlines

Issue	Due to Editor
September '11	08/05/11
December '11	11/05/11
March '12	02/03/12
June '12	05/04/12

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MEMBER NEWS

Don Jakes Retires

The MPCA's Don Jakes is retiring on June 30 after 35 years of service in Minnesota State government. Don was a member of the group that met in 1982 to form the Minnesota Ground Water Association, and he served as MGWA treasurer for some of the early years. Don worked for both the MPCA and the MN Department of Transportation (MnDOT) in the early part of his career. He began his career with the MPCA, mainly in spills and emergency response. After two years with the MPCA, Don went back to school at the University of Minnesota to study geology and hydrogeology. He then worked for almost two years with Rudy Ford as a geologist in MnDOT's Materials Engineering office. He then returned to the MPCA where he worked in solid waste regulation and for many years supervised the agency's ground water protection policy and technical development. In 1998, his work also involved programs that included surface water protection. In this capacity, he oversaw the work of staff in many programs including feedlots, septic systems, and stormwater management. He has served as the MPCA's stormwater program manager the past 4 ½ years.

As he prepares to make his exit, Don cherishes the opportunities he had to work with so many great people in the State's water agencies, local government, academia, the private sector, and elsewhere. Travels in the U.S. and abroad await Don and his wife Pam. Otherwise the future is unclear but filled with promise and anticipation—similar to the areas of work he's gravitated toward his entire career. He wishes all the best to the MGWA and the many folks who work so hard and well to continue to protect Minnesota's waters.



INDUSTRY NEWS

Carlson Professional Services, Inc. merges with McCain and Associates

MGWA member **Wade Carlson** is pleased to announce the expansion of Carlson Professional Services by its merger with McCain and Associates (McCain).

McCain is a civil engineering and environmental consulting firm based in Maple Plain, Minnesota, with a regional office in Bismarck, North Dakota. Their staff includes civil and geological engineers, geologists and hydrogeologists, ecologists, botanists, biologists, CADD and GIS technicians, and surveyors.

McCain's staff expertise substantially strengthens Carlson's current solid waste engineering and environmental capabilities. Founder John McCain, a leader in the solid waste industry, brings over 25 years of engineering experience in site development, facility design, and construction. In addition, the expertise of their natural resource staff (wildlife surveys, vegetation assessments, wetlands) will provide new environmental assistance to Carlson's clients.

Carlson projects include commercial/industrial properties, subdivisions (multi- and single-family residential, commercial, mixed-use), parks, transportation, utilities, landfills and petroleum. For more information, contact Wade at (763)489-7900.



AGENCY NEWS

MPCA's Minnesota Targeted Brownfield Assessment Program Assists MN Communities Develop Brownfield's and Greenfields

By John T. Betcher – MPCA VIC
Hydrogeologist & MNTBAP Coordinator

As everyone knows, funds are tight these days for brownfield developments. The MPCA is fortunate to have received an EPA Region V 128(a) Targeted Brownfield Assessment grant. The agency uses this grant to provide technical assistance for brownfield developments primarily in, but not limited to, out-state Minnesota through its Minnesota Targeted Brownfield Assessment Program (MNTBAP). The 2010-11 MNTBAP program has been underway since October 1, 2010 and will run until September 30, 2011. MNTBAP 128(a) funding is awarded to the MPCA on an annual basis by Region V EPA. The funding depends on the availability of Federal funds and is tied to the Federal fiscal year. Funding for FY 2011-2012 is at the same level as 2010-2011.

The MNTBAP provides technical assistance to communities for Phase I and Phase II Assessments and Response Action Plan development. The MNTBAP does not fund site cleanup. All assessments funded through the MNTBAP are performed by contractors.

The MPCA currently is working with AMEC/Geomatrix and Peer Engineering to perform these site assessments. Information from the assessment is shared with the community, the MPCA Voluntary Investigation and Cleanup (VIC) program, and EPA Region V. There are no staff costs or consultant fees to the community for MNTBAP work, and the program is intended to encourage and assist development of brownfield sites in out-state communities.

The MNTBAP currently is working with seven applicants who have been accepted into the program by EPA Region V. These projects include:

- ◆ The Rotary Park Dump in Chisago City which is being assessed to be part of a regional park system;
- ◆ A site contaminated by lead in Chaska where there are plans to develop a rails to trails regional trail on the old Union Pacific rail right-of-way;

- ◆ An affordable housing development in Dakota County;
- ◆ A commercial development in the city of West Duluth which will convert former industrial land to commercial use.
- ◆ A potential restaurant in Pine City is under evaluation by Cass County;
- ◆ The Holland Neighborhood Association is evaluating whether to convert an old plating shop into a sports field for Edison High School; and
- ◆ Conversion of abandoned buildings into apartments on Central Avenue in Minneapolis.

The MPCA is working with other community leaders on other potential brownfield projects and expects additional applications soon. Applications are encouraged and accepted at any time and assistance is available to complete application materials. The eligibility requirements for MNTBAP 128(a) assessments are articulated in the MNTBAP application and start with pass fail items in the first 7 questions of the application. Eligible Sites should be Brownfield Sites that have community support for Brownfield development. All applications are reviewed by Region V EPA to approve the use of 128(a) funding.

The MPCA recommends calling to discuss the project with MNTBAP staff prior to completing an application to determine if there are any roadblocks to the Site entering the MNTBAP program.

MNTBAP application materials are available on the MPCA web site in the "Brownfield" section. www.pca.state.mn.us/index.php/waste/waste-and-cleanup/cleanup-programs-and-topics/cleanup-programs/brownfields.html?menuid=&redirect=1

These materials include an application form, a draft application letter, and an MPCA access agreement. Fact sheets explaining the MNTBAP program also are available. Projects are funded in the order of approval into the program by MPCA and EPA Region V.

If you are a community leader or represent a community entity and feel you have a brownfield project that may be eligible for the MNTBAP please give John Betcher (MNTBAP Coordinator) a call at 651-757-2226 or an email at john.betcher@pca.state.mn.us.

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The primary objectives of the MGWA are:

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



Minnesota Pollution Control Agency

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Links at www.mgwa.org

Abbreviations and Acronyms

- ◆ ASTM – American Society for Testing and Materials
- ◆ DNR – Minnesota Department of Natural Resources
- ◆ MDA – Minnesota Department of Agriculture
- ◆ MDH – Minnesota Department of Health
- ◆ MGS – Minnesota Geological Survey
- ◆ MPCA – Minnesota Pollution Control Agency
- ◆ USEPA or EPA – United States Environmental Protection Agency
- ◆ USGS – United States Geological Survey

ASSOCIATION NEWS

GSA 2011, October 9 – 12, Minneapolis

By Mindy Erickson, MGWA President and GSA Local Committee Member and Short Course Co-Chair

MGWA will not be hosting a fall conference or field trip this year – to encourage as many MGWA members as possible to attend the GSA 2011 technical sessions, short courses, and field trips in October. We have a wide range of interesting and important groundwater projects happening in Minnesota, and GSA 2011 will be a chance to showcase our work and our active groundwater community. Please consider being actively involved in GSA 2011 as a presenter or attendee. MGWA also will have a booth at GSA, and Audrey Van Cleve (Audrey.Van.Cleve@state.mn.us) is coordinating volunteers to staff our booth during the meeting (it's not too early to volunteer!).

Conference registration is open, and early (discounted) registration ends Tuesday, September 6 (www.geosociety.org/meetings/2011/reg.htm). MGWA members qualify to register at the member rate. Abstracts for technical sessions are currently being accepted, and the abstract submittal deadline is Tuesday, July 26 (www.geosociety.org/meetings/2011/techProg.htm).

In addition to four days of technical sessions, dozens of field trips and short courses are being offered before, during, and after the annual meeting. Be sure to sign up for short courses and field trips early to ensure that your desired field trip or short course will run. MGWA is a sponsor of about a dozen of the hundreds of technical sessions and field trips being advertised. The MGWA Board thought the following sessions and field trips might be of particular interest to our membership:

Award Luncheon – Special Event/Ticketed Function #308

Luncheon to honor Dr. Otto Strack, and present him with MGWA's Outstanding Service Award for his decades-long service to U of MN students, the groundwater community internationally, and the citizens of Minnesota. Add on event registration required; scheduled for Monday, October 10.

Technical Sessions

T79. Analytic Modeling of Groundwater Flow: Advances and Applications - Randal Barnes

We seek presentations about the use of analytic solutions to groundwater flow or subsurface contaminant transport, including advances or applications in the analytic element method (AEM) or LT-AEM and other analytic solutions to flow or transport problems.

T80. Environmental Problems in Karst Terranes/Terrains and Their Solutions - In Honor of James F. Quinlan; E. Calvin Alexander, Geary M. Schindel

This session on applied karst hydrology and geology is held in honor of the late Dr. James Quinlan, one of the founders of modern karst research in the United States.

T85. Dynamic Gradients in Karst Aquifers - Daniel H. Doctor, E. Calvin Alexander

This session highlights approaches for understanding karst aquifer function in the face of dynamic gradients in head, chemistry, and temperature. Studies that provide a geologic context within which dynamic gradients may be interpreted are sought.

T86. Groundwater-Surface Water Interaction: Relating Understanding That Spans the Water-Rich Midwest to the Scarcity of the Outback - Peter G. Cook, Randall Hunt

This session highlights the understanding of groundwater-surface water interaction transferable across temporal and spatial scales, as well as end-members of climate forcing. The focus is on broad concepts transferable to settings critical for decision making.

T89. Innovative Field Investigations to Assess Natural Attenuation and Engineered Remediation of Subsurface Contamination - Isabelle M. Cozzarelli, Melinda L. Erickson, Jennifer T. McGuire, Jennifer R. McKelvie

This session will cover innovative chemical, physical, and microbiologic *in situ* methods developed to elucidate the fate of contaminants in a variety of hydrogeologic environments and focus on the elucidation and quantification of natural attenuation and remediation reaction progress.

T97. Advances in Understanding at the Groundwater-Surface Water Interface and

— continued on next page



Spring Conference a Success!

On May 4, 2011, the MGWA held its annual Spring Conference entitled Toward Sustainable Water Use in Minnesota at the Continuing Education and Conference Center of the University of Minnesota –St. Paul Campus. The conference was well attended by 219 people. Both the speakers and the mild spring weather were well received.

Minnesota State Representative Paul Torkelson spoke about the MN Clean Water Council's activities. He also discussed the rating of funding projects under the Legacy Act. As a legislator, he has observed a variety of water issues that are not always well understood.

Princesa VanBuren Hansen presented the 2010 Minnesota Water Plan produced by the MN Environmental Quality Board (EQB). It charts a road map for the future of Minnesota's water for the next ten years and beyond.

Professor Deborah Swackhamer (U of MN) outlined the aspects of the Minnesota Water Sustainability Framework. This plan is independent of the EQB Plan. It has been presented to the legislature and the governor as an action plan for sustainable water use. The plan ambitiously charts a future for addressing 90 specific needs that were prioritized as to-do items for Minnesota.

Jay Frischman, from the Minnesota DNR discussed the establishment of a groundwater monitoring network in the 11-county Twin Cities metropolitan area. There's an emphasis on co-locating new wells with Mt. Simon formation wells.

Jeanette Leete of Minnesota DNR spoke about the relatively new concept of groundwater management areas in MN. This is a watershed-based approach to water supply and water use management.

Lanya Ross of the Metropolitan Council discussed the recently developed groundwater-flow model for the Twin Cities metro-

politan area called the Metro Model II. This is a finite-difference model completed for the major aquifers of the Twin Cities area.

Troy Hall of Moorhead Public Service elucidated the Buffalo Aquifer Management Plan which involves the continuing conjunctive use of the aquifer for water supply to the city of Moorhead.

Linda Hutchins of the Massachusetts Department of Conservation and Recreation discussed regulation of safe yield of groundwater supply to support streamflow. In the implementation of this screening tool, Massachusetts regulators looked at predevelopment streamflow. Massachusetts has a very limited assemblage of usable aquifers.

David Hamilton of Michigan Department of Environmental Quality discussed the authorization of groundwater withdrawals in Michigan for large users. This is a new regulatory process in Michigan. He described a screening tool for evaluating these proposed flows based on a statewide classification of fish habitats.

MPCA hydrogeologist **Andrew Streit** described the results of a study of Little Rock Creek and how groundwater pumping resulted in the biological impairment of the creek. Andrew found that high capacity withdrawals reduced flow in Little Rock Creek.

James Cannia of the USGS and **Rod Horn** of the South Platte Natural Resources District in Nebraska spoke about the challenges of managing water in a heavily irrigated region. Remote sensing in the form of a heliborne electromagnetic survey was used to map aquifer depths.

Thanks to the speakers and the many poster session presenters.

To view photos, speaker bios, PDF versions of the presentations, and audio files, check out www.mgwa.org/membersonly/2011/spring/spring2011.php.

by Kurt Schroeder, Newsletter Team

GSA Update, cont.

Challenges for the Future: A Reflection on Tom Winter's Legacy - Donald O. Rosenberry, Walter E. Dean, Melinda L. Erickson

This session will commemorate Tom Winter's contributions to the study of groundwater-surface-water exchange, discuss how they affect lake and wetland paleolimnology and hydrology, and suggest challenges and directions for future research and water-resource management.

T193. Complexity in Modeling: How Much Is Too Much? - Randall Hunt

Modeling is a state-of-the-practice tool. However, models - defined as being simplifications of reality - are often simplified subjectively, thus sub-optimally. This session focuses on methods to enhance application of model complexity to decision making.

T194. Decision Support for the Geosciences: The Interface between Public, Policy, and Science - Suzanne A. Pierce, Tony Jakeman

Decision support for the geosciences can convey meaning and reveal patterns that are relevant for society. Pairing computational techniques and social processes expands understanding, access, and communication of science-based concepts for collaborative learning and informed dialog.

T204. Advances in Characterizing Sources and Release of Naturally Occurring Trace Elements to Aquatic Systems and Groundwater - Sarah L. Nicholas, Brandy M. Toner

The session will focus on characterizing sources and mechanisms

of release of naturally occurring trace elements to waters. We encourage abstracts addressing elemental speciation and advancement in analytical techniques for trace-element concentrations in geologic matrices.

Field Trips

415. Cycling the Mississippi River Gorge, Sat., 8 Oct. Leaders: Scott C. Alexander, Univ. of Minnesota; Kent Kirkby; Rebecca Clotts.

416. Southeastern Minnesota Karst Hydrogeology: New Insights from Data Loggers, Tracing, LiDAR, and Hydrophysics, Sat., 8 Oct. Leaders: E. Calvin Alexander, Univ. of Minnesota; Jeffrey A. Green; Anthony Runkel; Katherine J. Logan.

424. Subterranean Twin Cities, Tues., 11 Oct. Leader: Greg Brick, Univ. of Minnesota.

427. Springs and Waterfalls of the Twin Cities, Wed., 12 Oct. Leader: Greg Brick, Univ. of Minnesota.

438. Groundwater-Surface-Water Exchange and Geologic Setting of Northern Minnesota's Lakes, Wetlands, and Streams: Modern-Day Relevance of Tom Winter's Legacy, Thurs.-Fri., 13-14 Oct. Leaders: Donald Rosenberry, U.S. Geological Survey; David R. Lee; Perry M. Jones; Kelton D. Barr; Howard D. Mooers.

Visit the GSA 2011 website for detailed information regarding all aspects of the meeting - and to register: www.geosociety.org/meetings/2011/.

Big Backyard

The Science Museum of Minnesota's Big Backyard reopened for the season on May 28th. The Big Back Yard's hands-on exhibits and miniature golf course illustrate landscape evolution, river dynamics, and biodiversity. In addition, this outdoor gallery features a prairie maze, gardens, a camera obscura, and an award-winning solar-powered building.

www.smm.org/bigbackyard/

By the MGWA Newsletter Team



Minnesota Researchers on the Web

"The modern version of a field journal, a place for reports on the daily progress of scientific expeditions — adventures, misadventures, discoveries. As with the expeditions themselves, you never know what you will find." Such is the description given by the New York Times of their "scientist at work" blog on the nytimes.com website.

What we found there was a Minnesota connection: John Goode, a professor of geological sciences at the University of Minnesota-Duluth, who with Jeff Vervoort, an isotope geochemist from Washington State University, has posted blogs regarding their research expedition in Antarctica. See their posts at: scientistat-work.blogs.nytimes.com/tag/antarctica/

by the MGWA Newsletter Team



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President's Letter, cont.

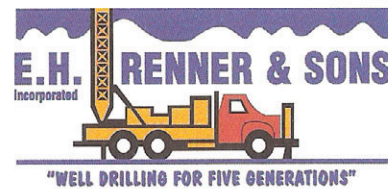
internationally, and the citizens of Minnesota. This award will be presented during a luncheon being hosted by MGWA in honor of Dr. Strack. The luncheon, tentatively scheduled for Monday, October 10, will be a separate, ticketed event at the conference. If you would like to attend the awards luncheon, please look for it as a separate purchase item when you register for the conference.

Secondly, MGWA is sponsoring a technical session and field trip revisiting the late Tom Winter's contributions to the fields of hydrogeology and limnology. Tom's stellar career began in Minnesota and ended abruptly last October, prompting us to reflect on his many contributions to the study of the groundwater/surface water interface, and to contemplate future research directions. Tom's contributions spanned the disciplines of geology, hydrogeology, limnology, and even palynology, and his was seminal work in the area of understanding groundwater/surface water interactions. Perspectives of Tom's career will be provided by Tom's doctoral advisor, Olaf Pfannkuch, and others.

Have a wonderful summer!

ROGER E. RENNER
President

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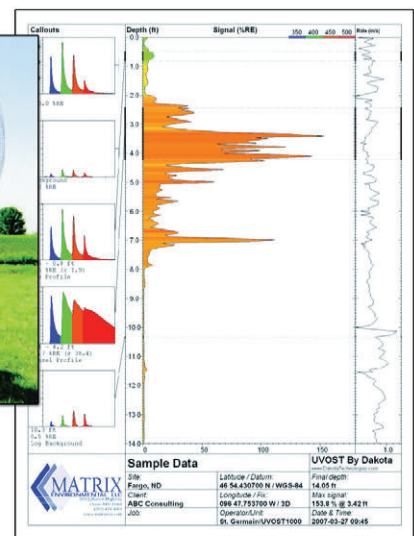
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Subterranean Wonders, continued from page 1.

(shrimp-like crustaceans), which in turn serve as prey for fishes that happen to enter the cave. The most unusual creature observed in Carver's Cave was a beaver, which had assembled a cache of sticks on the beach just inside the entrance. The cave, throughout the time it has been known, has undergone cycles of naturally sealing itself with debris from the cliffs above and being dug open again by enterprising individuals, about once each generation. The reopening of Carver's Cave which garnered by far the most publicity was that by John Colwell in 1913. Having long suffered from its location along a major railway, the cave is now preserved in the Bruce Vento Nature Sanctuary.

Fountain Cave. Although Carver's Cave is better known, St. Paul's other natural sandstone cave, Fountain Cave, was more spectacular physically. Known by several other names, Fountain Cave, traversed by its namesake stream, was 1,150 feet long, the longest natural sandstone cave in the Upper Midwest. The stream entered the cave at its upstream end through a sinkhole, flowing out through the lower end into a gorge described as "the beautiful little valley," produced by progressive collapse and retreat of the cave roof. The cave was made up of a series of 4 rooms, and the last one, dubbed Cascade Parlor, contained a waterfall. Located on the Mississippi River, the cave was described by travelers from 1817 onwards and supposedly became the birthplace of the city of St. Paul when Pig's Eye Parrant settled there in 1838. The first ever depiction of a Minnesota cave is a sketch of Fountain Cave, dated 1850. It became the first commercial cave in Minnesota. In the 1850s, torchlight tours were provided of the cave by guides. After 1880, the cave became a sewer for the overlying railroad shops and the entrance was finally buried in 1960 during



160 — Mouth of Fountain Cave, near St. Paul.

the construction of Shepard Road. An historical marker commemorates the spot today.

— continued on next page

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Subterranean Wonders, cont.

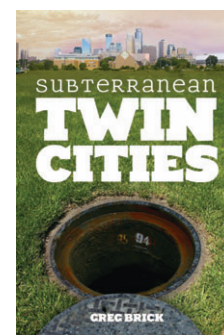
Mystic Caverns. Mushroom Valley was the name for a stretch of the Mississippi River gorge along St. Paul's West Side, where for nearly a century mushroom caves were operated. One of the abandoned caves, called Mystic Caverns, was reborn as a nightclub at the end of Prohibition in 1933. Located upriver from the High Bridge near "the huge Neon Skull and Crossbones," the cave was large enough to hold 800 people. Garish newspaper advertisements for Mystic Caverns promoted "St. Paul's Underground Wonderland," advising readers to "See the Beautiful Silver Cave and the Rainbow Shower of 2,000 Mirrors. Dine, drink, and dance to the rhythmic tunes of Jack Foster's Ten Cavemen." There were three main chambers, one of which served as a ballroom called the Silver Cave. According to one patron, the cave contained "a monstrous chandelier, with lights flashing all different colors, two stories above the polished-wood dance floor." "A system of loud speakers wafts the music from the main dining room into the farthest recesses of the innumerable smaller caverns which serve as private dining rooms," it also was reported. "Entertainment features will be in keeping with the mystic atmosphere, providing palmists, mind readers, psychics, and a magician for the amusement of guests." As if that was not enough, "Ghosts will stalk the river bank, 'living' skeletons will move about its cavernous rooms, weird specters will peer from hidden recesses, and women will float above the heads of the orchestra." By far the biggest draw was the nude fan dancer, Sally Rand. This unique nightclub was shut down by city officials on a technicality the very next year but the abandoned cave exists in the woods near Lilydale.

St. Paul's Underground Wonderland

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If you'd like to read more, an extended account of these and other wonders is provided in Greg Brick's SUBTERRANEAN TWIN CITIES, published by the University of Minnesota Press in 2009.



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QUESTION OF THE QUARTER

Question of the Quarter!

Test your knowledge!

Learn something new!

Question of the Quarter

The Question of the Quarter is an occasional feature of your newsletter in which a question is posed and all members are invited to respond. Send your answer to: editor@mgwa.org

What familiar hydrogeologic term derives its origin from the activities of Carthusian monks and is named after a former province of France that became part of France as a princess's dowry?

We received this ambitious answer: “ ‘aquifer’... the princess's dowry belonged to Eleanor of Aquitaine, a former province of France.”

The correct answer was provided by James Piegat. It is “artesian”. Jim correctly identified that “artesian” is the adjectival form of Artois, which in 1180 became part of northern France as the dowry for a Flemish princess. Artesian wells were named after the former province of Artois in France, where artesian wells were constructed by Carthusian monks.

en.wikipedia.org/wiki/Artesian_aquifer#cite_note-0

The Flemish princess was Isabelle of Hainaut. The Spanish ruled Artois in the 16th Century and it passed back to the French in 1659. Pierre-Charles Le Sueur was originally from Artois.

en.wikipedia.org/wiki/Artois



Map of the province of Artois in the 16th century.

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Estimation of Groundwater Input to a Stream from a Heat Budget

By Ben Janke, Department of Civil Engineering, St. Anthony Falls Laboratory, University of Minnesota

Background

Thermal pollution of coldwater streams resulting from urban growth is a concern for fisheries. Urban development may increase surface water runoff temperature and volume, reduce natural groundwater recharge, and heat shallow aquifers below paved surfaces (Galli, 1990; Paul and Meyer, 2001). Rising stream temperatures impose a stress on temperature-sensitive biota, especially coldwater fish such as trout. One stream in Minnesota, Miller Creek in Duluth, is currently on the Minnesota Pollution Control Agency's impaired waters list for temperature impairment and the absence of trout. There is growing concern that other trout streams in urbanizing watersheds, such as the Vermillion River in Dakota County, may also begin to suffer the effects of thermal pollution.

The thermal impact of a proposed urban development on a coldwater stream can be predicted using models of storm water runoff and stream temperature. One crucial component of the heat budget to a coldwater stream is the groundwater input and the other is shading. While riparian shading can be responsible for the low temperatures present in a trout stream, many of these low temperatures are maintained by inflow of cold water, which in Minnesota commonly comes from shallow aquifers, deep springs, or shaded wetlands. Groundwater inflow is not only an important input to coldwater stream temperature models, but also identifies the location of "gaining" stream reaches which need to receive special attention when urban developments in a watershed are planned.

Estimating the groundwater flow rate into a stream is complicated. Existing estimation methods rely on direct measurement with seepage meters, groundwater level measurements in piezometers located within and adjacent to the stream, or measurements of streamflow rates at consecutive stream gaging stations. There are rarely enough streamflow gages in a stream to use the last approach. The spatial variability of groundwater input can be difficult to quantify with water-level data (which requires an estimation of hydraulic conductivity) or seepage meters, which are challenging to install in moving water.

In light of these difficulties, the use of temperature as a tracer for groundwater movement has become common in recent decades (Anderson, 2005). The use of temperature data is attractive because commercially available temperature loggers are robust, accurate, and are fairly inexpensive, which makes it possible to monitor temperature at fine spatial and temporal resolutions. In previous work, water temperature has been employed to identify stream reaches as "gaining" or "losing" by comparing stream and groundwater temperatures, and streambed temperature profiles have been used to determine flow rates from numerical solutions of a heat transport equation (e.g. Bartolino and Niswonger, 1999). Generally these approaches limit the results to calculating a groundwater inflow rate at a single point of stream / groundwater temperature measurement.

A Heat Budget Approach

An alternative approach is presented in this paper which determines the mean groundwater inflow rate for a stream reach rather

than at a single point. The approach is based on the knowledge that water temperature in a stream reach responds to heat fluxes across the water surface (due to weather and shading conditions), heat exchange with the streambed, heat carried by the stream flow, and heat input/output due to groundwater. These heat fluxes can be readily calculated from available climate, flow, and stream/streambed temperature data, with the exception of groundwater heat flux, which is the only unknown in the heat budget. This heat flux is formulated simply as the groundwater inflow rate multiplied by the groundwater temperature; therefore, with an accurate estimate or measurement of groundwater temperature, the inflow rate can be found. A schematic of the model and major heat flux components for a stream reach is shown in Figure 1.

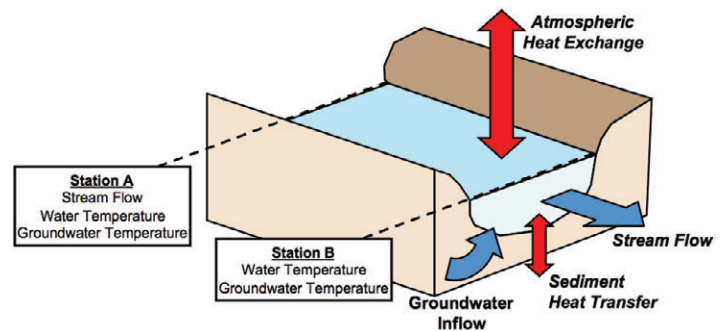


Figure 1. Schematic of the heat budget approach, illustrating major heat flux components and water data required to apply the model to a stream reach.

At bare minimum, the following data are needed to implement such an approach:

- ◆ stream temperature at the upstream and downstream ends of the stream reach;
- ◆ groundwater temperature or streambed temperature at one or more locations within the stream reach;
- ◆ stream flow at either end of the stream reach;
- ◆ weather data (solar radiation, air temperature, dew point temperature, and wind speed), measured near the reach;
- ◆ stream geometry, including stream reach length and width;
- ◆ stream shading/sheltering, averaged for the stream reach and estimated e.g. from aerial photography.

Such an extensive list of data was available for various reaches in the Vermillion River, a stream located in the Metro area that has been the focus of intense monitoring efforts over the last decade because the stream's trout habitat is threatened by urbanization in the watershed. Data collection for a number of projects has been carried out by various public and private entities, including the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, Metropolitan Council, Scott County and Dakota County Soil and Water Conservation Districts, Barr Engineering, Inc. and Applied Ecological Services, Inc. Of particular interest was the installation in 2006 of roughly 30 stations in the watershed where stream temperature and streambed temperature (at a depth of roughly 2 feet) were measured.

— continued on page 12

Estimating Groundwater Inputs, cont.

Method Application and Results

The Vermillion River was considered ideal for application of the heat budget approach because the low water temperatures were known to be sustained by groundwater inflow even if the locations of greatest inflow were not precisely known. A total of five stream reaches were suitable to apply the method, using weather, flow, and water temperature data from June – September of 2007 and 2008. The model was generally applied at an hourly time step, with results averaged over half-month periods.

Estimated mean seasonal (June – September) groundwater inflow rates to the selected reaches in 2007 and 2008 are shown in Figure 2; results are presented both in cfs/mile and as the percentage of observed stream flow contributed by groundwater inflow in that particular reach. All five stream reaches are “gaining” reaches with significant groundwater contributions (22% to 40% of streamflow in 2007 and 11 to 67% in 2008). Considerable spatial variation of groundwater inflows also is present, which is related to both the hydrogeology of the watershed and modeling errors at high stream flows. In particular, the results for Reaches 3 and 4 are unrealistically high and should be disregarded.

The mean groundwater inflow rates are of similar magnitude in 2007 and 2008, despite different seasonal precipitation totals (36.5 cm in 2007 vs. 23.1 cm in 2008). In two of the stream reaches (Reach 1 and Reach 3), the estimated groundwater inflow rates were higher in the drier year; in two other stream reaches (Reach 2 and Reach 5) they were lower for the drier year. Possible explanations for the higher inflow in the drier year are: (1) Reach 3 appears to receive some groundwater from a deeper aquifer, as indicated by streambed temperatures that are

consistently low throughout the year; (2) North Creek (Reach 1) received a construction site de-watering discharge in 2008; and (3) lower stream stages create a larger head gradient between the water table and the stream, which may enhance groundwater inflow.

The time variability of groundwater input to the Vermillion River can be seen by investigating the results from a single stream reach. For example, consider the time series of estimated groundwater inflow, measured average stream flow, and observed precipitation shown in Figure 3 for North Creek (Reach 1), a poorly-shaded tributary that sits in a sandy part of the watershed with a high water table.

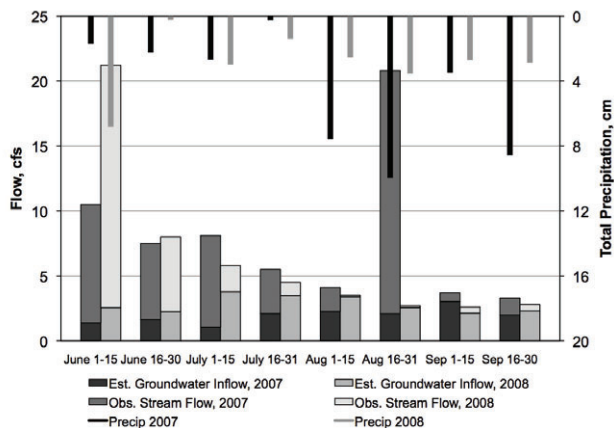


Figure 3. Mean observed stream flow (cfs) and estimated groundwater inflow in Reach 1 (North Creek) in 2007 and 2008, and total precipitation (cm) by half-month periods. The estimated groundwater inflow (cfs) is shown as the darker-shaded section at the bottom of each column.

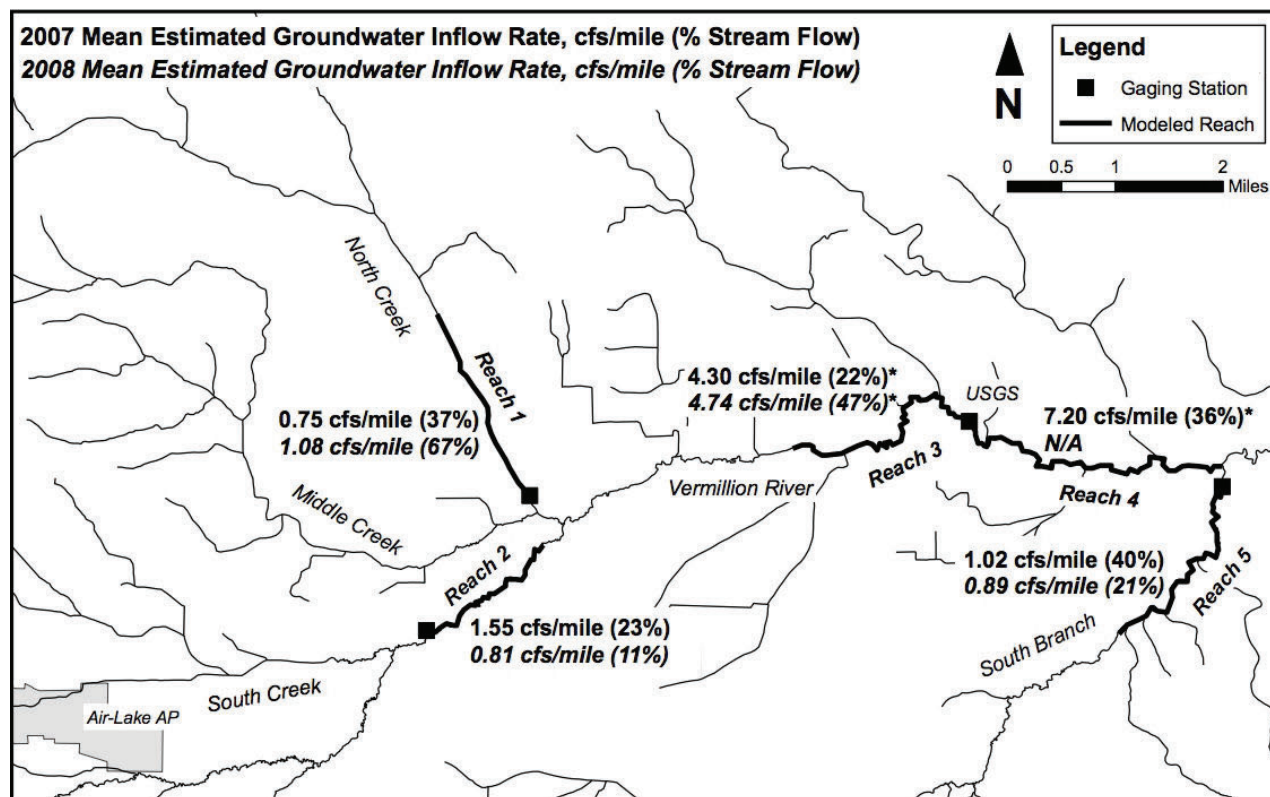


Figure 2. Estimated mean seasonal (June – Sep) groundwater inflow rates to selected reaches in the Vermillion River, 2007 and 2008. Results shown in cfs/mile and as percentage of observed stream flow. Location of stream gauging sites also shown. *Note that the results for Reaches 3 and 4 are unrealistically high due to model limitations.

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Estimating Groundwater Inputs, cont.

In general, the results suggest that North Creek receives significant groundwater inflow (0.91 cfs/mile on average, or 52% of observed stream flow), and that this inflow is highly variable with time, ranging from 0.45 to 1.45 cfs/mile (10% to 97% of stream flow) with a standard deviation of 0.32 cfs/mile (32%). More specifically, groundwater inflow makes up a greater percentage of stream flow during low-flow periods, such as in much of 2008 (a dry year). During high-flow periods, such as August 2007, the absolute groundwater inflow rate increases slightly but makes up a smaller portion of the stream flow, which is dominated by storm water runoff. Surface water inputs to the stream reach are not accounted for in the model, and will cause errors in groundwater inflow estimates during wet periods. The large estimated groundwater inflow in early September 2007 following the heavy rains in August may be an example of this effect, but it may also be caused by a fast coupling between infiltrated rainfall, the shallow groundwater system, and North Creek.

Additional results as well as a detailed description of the model development and application can be found in a report by Janke *et al.* (2010).

Limitations

The heat budget approach is not without limitations. In particular, the method relies on high accuracy of input data, as any errors in the data will show up in the calculated groundwater inflow rate. Other constraints are as follows: (1) the reach must be a gaining reach, and there must be a significant temperature difference between the stream and groundwater, otherwise groundwater does not impact stream temperature; (2) groundwater inflow must be large relative to stream flow (such as in small reaches and tributaries), as the approach over-predicts inflow rate for stream flows larger than roughly 15-20 cfs; (3) dry periods or reaches with few unengaged tributary or stormwater inflows should ideally be used for application, as surface inflows contribute heat fluxes that are difficult to characterize in a simple heat budget approach.

New Rules to Protect Groundwater from Impacts due to Onsite Wastewater Treatment

By Mark Wespetal and Gretchen Sabel

Introduction

Concerns about nitrogen impacts to groundwater have driven significant change in the regulation of onsite wastewater treatment systems (i.e., subsurface sewage treatment systems or SSTS). These changes are now beginning to be implemented. The involvement of licensed geoscientists will be needed in some situations to assist the SSTS Advanced Designers in their work. Before 2008, the SSTS rules primarily addressed single family dwellings or small establishments. However, with the current interest in clustering many dwellings into one or more large SSTS and large systems serving large establishments, the need arose for new regulations to improve the environmental performance of larger SSTS. In order to better understand the new regulations, it is helpful to understand the past regulations for smaller systems. This discussion will focus mainly on groundwater protection issues.

The First Rules

The very first SSTS rules developed by the MPCA in 1978 pro-MGWA Newsletter June 2011

Conclusions

Application of the heat budget approach to the Vermillion River was challenging because of the presence of storm water and tributary inflows, a wide variety of land uses, and complex hydrogeology. The results may be useful for identification of groundwater gaining reaches, to make general conclusions about the seasonality of groundwater input, or to investigate the source of groundwater input (i.e. shallow vs. deep groundwater), but their accuracy is likely not sufficient to serve as input to a detailed stream temperature model as was originally hoped. However, the method is fundamentally sound, provided that the above constraints are borne in mind. The method is attractive because the data required, while substantial, can be simple and inexpensive to collect relative to traditional methods, and model accuracy can be improved with higher quality and spatial resolution of stream and streambed temperature measurements.

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ected groundwater from contamination by fecal organisms and synthetic organic chemicals for small SSTS. Initially, this focus developed out of concerns for shoreland areas where dwelling density was high and dwellings were dependent on private wells for water supply. There were also significant concerns relating to discharge to lakes both directly through discharge pipes or through groundwater discharge.

The early rules protect the groundwater from fecal organism contamination in four ways:

- ◆ Soil dispersal systems were required to have a three-foot separation distance between the bottom of the soil dispersal unit and the periodically saturated soil or bedrock (resulting in unsaturated flow of effluent).
- ◆ A relatively large soil dispersal area was required which resulted in a light hydraulic loading rate and unsaturated flow of effluent and longer residence time in the unsaturated soil.
- ◆ The soil texture provided adequate surface area and retention time (e.g., not gravelly material).
- ◆ The system was relatively shallow and had good oxygen transfer with the atmosphere. This is needed for the biochemical breakdown of organic constituents.

— continued on page 14

SSTS Rules, cont.

Based on the research available, complete removal of fecal organisms takes place in the three-foot soil treatment zone. However, factors affecting complete treatment of fecal organisms include peak flows, rainfall events, poor distribution of effluent, cool soil temperatures, and preferential flow.

SSTS rules also address synthetic organic contaminants. These contaminants come from products such as cleaners, solvents, medicines, and personal care products. Due to the number and variety of synthetic organic chemicals and the lack of knowledge of how they are treated by the soil, state rules have consistently prohibited the discharge of these chemicals over and above the types and amounts found in normal domestic sewage. The small discharge of a single system along with the likelihood of some treatment in the soil was believed to adequately protect the groundwater. Research in this area is underway; future regulations may be needed if problems are discovered. Some systems are now employing advanced treatment (aerated devices) that may afford some treatment before discharge into the soil.

It should be understood the compliance boundary for all contaminants from small SSTS is the uppermost saturated layer, whether it be seasonal, perched or regional. Commonly, the three-foot unsaturated treatment zone is designed to accommodate a seasonally fluctuating saturated soil layer. This seasonally fluctuating saturated layer commonly is within one to five feet from the ground surface. Therefore, many SSTS in Minnesota either are very shallow in the ground or elevated above the ground surface (mound system).

New Direction; New Rules

The SSTS rules were revised in 2008 and 2011 to address the need for design and operational standards for larger systems. Prior to the new rules, all systems with a flow up to 10,000 gallons per day (gpd) generally were designed and operated in the same way as a system serving a single-family home.

SSTS's over 10,000 gpd require a state permit, issued by the MPCA. The state permit requirements for SSTS were substantially greater than those required by the local permitting authority, leading to a great disparity between regulation of systems under 10,000 gpd and those over 10,000 gpd. In the area of groundwater alone, the state permit required:

- ◆ The determination of groundwater direction to define the compliance boundary (i.e., downstream property line)
- ◆ The system meeting drinking water standards for nitrogen (not easy or cheap)
- ◆ Monitoring to determine compliance (discharge of last treatment device or groundwater monitoring wells)
- ◆ The determination of groundwater mounding for adequate separation distance for fecal removal and hydraulic performance.
- ◆ Possible measurement for volatile organic compounds

The new rules addressed this disparity in SSTS regulations. The new rules provided incrementally more regulation as the flow (system size) increased, or the site was deemed to be more sensitive to contamination.

The first regulatory cut-off is for systems under the new rules between 2,500 gpd and 5,000 gpd. For this size system, a person with greater training needs to do the design (advanced designer) and operation (service provider). The system design must employ a nitrogen-reducing best management practice (BMP) if the groundwater at the site is deemed to be sensitive to nitrogen inputs from the system. The determination of "sensitive" is a fairly

simple determination based on the proximity of nearby wells (or the future potential of nearby wells), the amount of sand in the soil, or if mapping has indicated the area to be sensitive. If this simple determination indicates that the site is sensitive to possible groundwater contamination, a nitrogen reducing BMP needs to be employed or a detailed determination of sensitivity could be conducted by a licensed geoscientist or engineer to show that this is not necessary. Nitrogen reducing BMP's include mound systems placed on a thick, dark topsoil; or a nitrogen reducing treatment device, chosen from a list of registered treatment devices that is maintained by the MPCA. A list of those devices can be found at: www.pca.state.mn.us/index.php/water/water-types-and-programs/wastewater/subsurface-sewage-treatment-system-ssts/product-registration-process-for-treatment-products-distribution-media-and-sewage-tanks.html. It should be noted the BMP does not have a prescribed reduction limit nor is monitored for performance. However, the BMP is periodically is checked to see if it is still in place and operating.

The next regulatory cut-off is for systems with a flow between 5,000 to 10,000 gpd. These systems are known as mid-sized SSTS or MSTs. These systems also require a person with greater training to do the design and operation. If the system was deemed to be in a non-sensitive groundwater area, the system must employ a nitrogen reducing BMP. If the groundwater at the site is deemed to be sensitive to nitrogen inputs, the system must meet a 10 mg/l nitrate as N limit at the property boundary or nearest receptor, whichever is closest. The sensitivity analysis is based on a simple mass balance model. If the site is determined to be sensitive from the simple model the system owner can hire a licensed geoscientist or engineer to conduct a more robust assessment. If the additional assessment still determines the site to be sensitive, then nitrogen treatment methods must be designed by a licensed professional engineer. Due to the difficulty of removing nitrate to meet the 10 mg/l limit, multiple nitrogen reduction processes likely will need to be employed. These include:

- ◆ Reducing the concentration of N in the influent;
- ◆ Employing a state registered N reduction treatment device;
- ◆ Accounting for natural N reduction (nitrification and denitrification) in the soil. This can be accomplished by keeping the system shallow and near carbon source (i.e., topsoil) and through controlled dosing and resting regimes;
- ◆ Accounting for natural N reduction in the groundwater; and
- ◆ Accounting for dilution from precipitation and upgradient groundwater (if dilution capacity exists).

The removal of nitrogen by harvesting of very deep rooted plants appears to be ineffective and is not taken into account as a loss of nitrogen.

It should be noted that MSTs will require additional operational procedures and monitoring to achieve the needed nitrogen reduction. In most instances, it is anticipated that natural nitrogen loss will be estimated. This will result in imposing a nitrogen limit on the end-of-pipe treatment, and this device will be required to be monitored.

Due to the greater effluent volume associated with the larger systems, a groundwater mounding estimation is required to determine if the needed vertical separation distance will be achieved during system loading and operation. The SSTS advanced designer can make this initial determination using various groundwater mounding models. The groundwater mounding models available are based on a 2005 report entitled: Guidance for Evaluation of Potential Groundwater Mounding Associated with Cluster

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The Minnesota Water Science Center has Released Two Reports that Involve Chemicals of Concern

Excerpt from USGS Minnesota Water Science Center Newsletter - Summer 2011

The first report describes a study of contaminants of concern in wastewater and in streams and lakes that receive wastewater-treatment plant effluent in Minnesota. The study was a cooperative effort among the U.S. Geological Survey, the Minnesota Pollution Control Agency, St. Cloud State University, the University of St. Thomas, and the University of Colorado. The objective of the study was to identify distribution patterns of endocrine active chemicals, pharmaceuticals, and other organic and inorganic chemicals of concern indicative of wastewater effluent, and to identify biological characteristics of estrogenicity and fish responses in the same streams.

The second report summarizes 14 years of research and monitoring of endocrine-active chemicals and biological responses in Minnesota. Endocrine active chemicals have been identified in wastewater-treatment plant effluent and surface waters downstream from discharge of wastewater-treatment plant effluent throughout Minnesota. Although concentrations are typically low, endocrine disruption has been detected in wild fish throughout Minnesota at sites downstream from wastewater-treatment plant effluent. Endocrine active chemicals and endocrine disruption have also been detected at sites with no wastewater effluent discharge. This work has involved St. Cloud State University, Minnesota Department of Health, Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, Metropolitan Council Environmental Services, and the University of Minnesota. Additional information on contaminants of emerging concern is available on the USGS project page.

SSTS Rules, cont.

and High-Density Wastewater Soil Absorption System, which was sponsored by the National Decentralized Water Resources Capacity Development Project. This report can be found at: www.decentralizedwater.org/research_project_WU-HT-02-45.asp. A Microsoft Excel spreadsheet was developed in companion with this report to aid in calculating the height and extent of the groundwater mound under MSTs. The spreadsheet is based on the 1967 paper by Hantush entitled: Growth and decay of groundwater mounds in response to uniform percolation. The model inputs are based on field samples or measurements made to determine the soil's saturated hydraulic conductivity. If mounding is found to be problematic, the advanced designer must redesign the system. The redesign may include making the system larger, adjusting the system geometry, or dividing the system into small units and spreading these units over a large area. Lastly, monitoring is required to ensure the designed vertical separation distance is met.

To supplement the new rules for larger SSTS, the agency has developed a guidance document entitled: Subsurface Sewage Treatment Systems Prescriptive Designs and Design Guidance for Advanced Designers. This document provides prescriptive approaches to system siting, design, construction, operation, and management. Please refer to this document for more information on groundwater issues for larger SSTS. The document can be found at: www.pca.state.mn.us/index.php/view-document.html?gid=5318.

In summary, concerns about nitrogen impacts to groundwater have driven significant change in the regulation of onsite wastewater treatment systems. These changes are now beginning to be implemented; the involvement of licensed geoscientists will be needed in some situations to assist the SSTS Advanced Designers in their work.

System size based on design flow (gallons per day or gpd)	Removal of Pathogens,	Nitrogen Reduction	Groundwater Mounding Determination
Up to 2500 gpd	Required – Achieve by soil separation and/or use of registered treatment devices.	Not required	Not required
2500 to 5000 gpd in non-sensitive groundwater setting	Required – Achieve by soil separation and/or use of registered treatment devices.	Not required	Not required
2500 to 5000 gpd in sensitive groundwater setting	Required – Achieve by soil separation and/or use of registered treatment devices.	Must employ BMP	Not required
5000 to 10,000 gpd in non-sensitive groundwater setting	Required – Achieve by soil separation and/or use of registered treatment devices.	Must employ BMP	Required – must ensure that separation is maintained
5000 to 10,000 gpd in sensitive groundwater setting	Required – Achieve by soil separation and/or use of registered treatment devices.	Must meet 10 mg/l nitrate as N at compliance boundary	Required – must ensure that separation is maintained
Over 10,000 gpd	Required – Achieve by soil separation and/or use of treatment devices.	Must meet 10 mg/l nitrate as N at compliance boundary	Required – must ensure that separation is maintained

MGWA BOARD MINUTES

Minnesota Ground Water Association Board Meeting Minutes

Meeting Date: March 4, 2011

Meeting Location: Fresh Grounds Restaurant, St. Paul, MN
Attendance: Mindy Erickson, President; Steve Robertson, Past President; Kelton Barr, President-Elect; Audrey Van Cleve, Treasurer; Jill Trescott, Secretary; Tedd Ronning, Newsletter; Jeanette Leete, WRI; Sean Hunt, WRI;

Past Minutes: February minutes approved as corrected.
Treasury: Jeanette submitted the Treasurer's report. Cash on hand is approximately \$52,000.
Newsletter: Tedd discussed the next newsletter, which should be completed today.
Webpage: The date and title of the Spring Conference are on the website. There have been a number of job announcements recently. There was general agreement an e-mail should be sent to the membership reminding them there were job postings on the website.

WRI Mgmt: Membership is down a little for this time of year, however, a number of memberships usually come in with conference registrations. Jeanette is helping the new Association and Foundation treasurers learn their procedures.

MGWAF Report: The Foundation will meet next week.
Old Business: Salary survey was discussed.
GSA 2011: It was decided to have a booth at the conference. Stu Grubb has the old booth. MGWA will be a sponsor, but the level was not decided. The question was raised about whether to have a ticketed event, such as a breakfast or lunch.
Spring Conference – May 4 – Theme will be Minnesota's Sustainable Water Use Planning & Implementation Efforts. Sean will send an e-mail inviting posters. Registration for students was raised to \$30 to ensure their attendance.

New Business: NGWA Associate Member invitation – tabled.
Letter supporting funding for County Well Index: Kelton moved to send letter as written; Steve seconded. All were in favor.
Chinook Book – Steve will discuss this at the Foundation meeting and see if they would like to take this on as a fund-raiser.

Meeting Date: April 1, 2011

Location: Fresh Grounds Restaurant, 1362 West 7th Street, St. Paul, MN
Attendance: Mindy Erickson, President; Steve Robertson, Past President; Audrey Van Cleve, Treasurer; Jill Trescott, Secretary; Kelton Barr, President-elect; Jeanette Leete, WRI; Sean Hunt, WRI

Past Minutes: March minutes approved as corrected.
Treasury: Audrey submitted the Treasurer's report. Cash on hand is approximately \$51,400.
Newsletter: Mindy reported on the newsletter, which just went out. Jeanette and the Newsletter Team are more accurately tracking file names and revision dates.

Web Page: The conference details and the newsletter are on the web page. The 2010 issues have been moved to "back issues." There have been more job openings posted.

WRI Report: Membership is showing a moderate decline. Having a booth at the GSA conference will be an opportunity for recruiting new members.

Foundation: The Foundation met in March. The endowment is now more than \$100,000, which was the financial threshold for offering scholarships. They are now considering scholarship criteria. The Foundation Board has asked that funds given them in trust by MGWA not be dedicated to the endowment so that the Foundation could use the funds at their discretion. Jeanette pointed out that this would not encourage the Foundation to raise funds.

Old Business: Surveys: A Salary survey and a newsletter survey will be conducted.
GSA 2011: The cost for MGWA members to attend the conference will be \$325 for the full (4 day) conference or \$225 for one day. There will be an "extra charge" luncheon in honor of Otto Strack. The fee for the booth will be \$120. Of the listed sponsorship opportunities, the consensus was that we'd rather sponsor a session or a field trip than the other items listed. Kelton will look into it.
Spring Conference – May 4 – Mindy asked for some help with "roving microphones" for people asking questions, a laser pointer, and a noise maker to get people to return to the sessions. Sean will make sure the microphones are on the work order. There will be a special meeting on May 3 at 3 p.m. for the water supply folks to talk more with the out-of-state speakers.
NGWA Associate Member invitation – MGWA will decline Associate Membership status. We still plan to invite future Darcy Lecturers to Minnesota.
Chinook Book – The Foundation was not interested in pursuing this.
Letters opposing the septic rule roll-back and setting limits to environmental regulation rulemaking were proposed by MEP. At the time of the MGWA Board meeting, both pieces of legislation were no longer being considered, so no action taken.

New Business: The question of establishing an annual budget for MGWA was tabled.

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MGWA Minutes, cont.

Meeting Date: May 13, 2011

Location: Fresh Grounds Restaurant, 1362 West 7th Street, St. Paul, MN
Attendance: Mindy Erickson, President; Kelton Barr, President-Elect; Steve Robertson, Past-President; Audrey Van Cleve, Treasurer; Sean Hunt, WRI
Past Minutes: Revisions suggested to April minutes. Approval deferred until next month.
Treasury: Review of balance sheet reveals cash on hand is approximately \$60,000 in the checking and savings accounts. Net income for the year is about \$22,000, but spring conference expenses are still not final.
Newsletter: June issue in progress. Newsletter committee distilling the results of the survey.
Web Page: Conference related activity. Will start posting information/links about fall GSA annual meeting.
WRI Report: Report distributed. Highlights include: 1) Much of last month's activity related to spring conference, 2) Membership at 547, 3) preliminary tax and audit preparations made, and 4) initial contacts/details relating to MGWA potential hosting 2012 Midwest Ground Water Conference discussed. Might need separate meeting to discuss last item in more detail
Old Business: Spring conference: Evaluations very positive. Logistics smooth. Students showed up. More posters than last time. Financials look good.
Salary survey 2011: Preliminary results on google docs. Intent is to leave the survey live until the end of June. Send final reminder email a week before closing. Summary article in September newsletter.
GSA 2011: Field trip schedules are up on GSA site. 12 folks signed up to staff MGWA booth at the conference.
Midwest Ground Water Conference: Proposal is to have MGWA lead this in fall of 2012. Decision deferred as additional information is gathered regarding logistics and legalities. Need supplemental meeting to discuss.
New Business: 2013 Conference dates. WRI to inquire about availability.

The MGWA Board of Directors meets once a month.

All members are welcome to attend and observe.



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Newsletter Survey Feedback

From the Newsletter Team

Thank you to the 100 members who took the time to respond to the March newsletter survey. The survey provided valuable feedback that helps us make the newsletter a publication that is valued by the MGWA membership.

In general, the survey respondents were satisfied with the content, length, and layout of the newsletter. Over 90% of the respondents to the question “Why do you read the MGWA newsletter?” read the newsletter to keep up with current and emerging issues in Minnesota ground water. The second-most frequent answer to that question was “professional development.” The newsletter team shares your views that these are important objectives of the newsletter, and we approach each newsletter with those goals in mind.

Over 90% of respondents said the technical articles are the newsletter feature of greatest interest. The technical articles also were the feature that most respondents would like to see get more attention. We understand the technical articles are a very important part of the newsletter, and we invite the readers to submit articles for publication. Contact any of the newsletter team members if you have questions about submitting an article. The newsletter is only as good as the contributions we receive, and we would like to thank our regular contributors.

One of the specific comments we would like to address recommended adding a feature where readers can discuss articles. Although the newsletter doesn’t currently have a dedicated format for discussing articles, readers are always welcome and encouraged to submit comments for publication. You can e-mail them to the editor-in-chief at tedd.a.ronning@xcelenergy.com.

Thanks again to all the survey respondents and for all the positive comments and suggestions.

MGWA 2011 Membership Dues

Professional Rate:	\$35
Full-time Student Rate:	\$15
Newsletter (printed and mailed)	\$20
Directory	\$7

Membership dues rates were revised at the October 1, 2010 meeting of the MGWA Board. The Board intends to balance the membership services budget.



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FOUNDATION MINUTES

Meeting Date: Tuesday, March 8, 2011

Location: Metro 94 Building, 455 Etna Street, St. Paul

Attending: Gilbert Gabanski, Chris Elvrum, Amanda Strommer, Steve Robertson, Cathy von Euw and Cathy Villas-Horns. MGWA Management present: Jennie Leete and Sean Hunt.

Review of Minutes The meeting minutes for the December 14, 2010 meeting were approved on February 12, 2011. The minutes were provided via e-mail to the MGWAF Board and the MGWA Newsletter staff.

Treasurer's Report MGWA Foundation balance as of March 2, 2011 is \$107,953.95. Interest in the amount of \$439.34 was accrued since 12/14/10 and was swept into the endowment. Total credits of \$637 from renewing memberships and donations to the MGWA Foundation were received during this period.
The H.O. Pfannkuch Fund balance as of March 2, 2011 is \$13,510.82. Interest in the amount of \$4.98 was accrued since 12/14/10 and was swept into the fund. Total donations of \$725 were received during this period.
Jennie put the financial information into an updated version of Quickbooks. Jennie noted that donations received for specific purposes must be spent on that specific purpose.
Gil asked Steve to talk to the MGWA Board about the MGWAF scholarship, since the MGWAF fund now has over \$100,000 in funds. In addition, the MGWAF Board would like the MGWA Board to allow the MGWAF Board to determine how the MGWA Board donations to the MGWAF will be divided up amongst various MGWAF accounts and ultimately disbursed by the MGWAF. Please note, the MGWAF Board has always had discretion over the interest earned in MGWAF accounts.

Old Business Gil stated that the MGWA Board President signed a letter of support for a legislative bill that included funding for the County Well Index so that it can be updated.
MGWA Board Meeting report – The spring 2011 MGWA conference is on May 4, 2011 and the theme is “Toward Sustainable Water Use in Minnesota”.
The fall 2011 MGWA conference will be affiliated with the national Geological Society of America (GSA) conference to be held October 9-14, 2011 at the Minneapolis Convention Center. Mindy Erickson is the GSA Liaison and is organizing MGWA's presence including special sessions. MGWA members will be able to register at a reduced rate. Single day registrations will also be available.
Jennie discussed a coupon book which could be purchased and then sold as a fundraiser for the MGWAF.

New Business Two grant requests were received. A request for \$2,000 for the Children's Water Festival was received from the Carver County Water Management Organization. Chris moved that the grant request be approved for \$1,500. Cathy von Euw seconded the motion. Motion passed.
A request for \$1,950 for a groundwater model and display was received from the Headwaters Science Center in Bemidji. Amanda had concerns with the septic system groundwater model and supported the use of a regular groundwater model. Chris moved that the grant request be approved for \$1,200 with \$1,131.91 coming from the K-12 Education restricted fund and the remaining \$68.09 coming from the unrestricted fund. Cathy von Euw seconded the motion. Motion passed.
Scholarship Discussion – Gil mentioned the American Institute of Professional Geologists (AIPG) scholarship program and Amanda had information about the Minnesota Onsite Wastewater Association scholarship. Gil mentioned Tom Clark is interested in this initiative and suggested a separate ad hoc committee which could review applications and make recommendations. Discussion occurred about what the scholarship requirements should be and whether there should be a subcommittee. The first step is to begin to set up the scholarship and process. Chris will set up a meeting of the MGWAF board prior to the September meeting to have a special discussion on this topic. Board members should gather information about other scholarship programs and start to generate ideas for how the scholarship should be structured.

Next Meeting The next meeting will be Tuesday, September 13, 2011 at 11:30 AM at the Metro 94 building.

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The MGWA Foundation is a 501(c)3 charitable organization. Donations to the Foundation are deductible on your state and federal income tax returns.