Minnesota Ground Water Association

Volume 15, Number 4: December, 1996

President's Letter

Your MGWA is coming out of a busy fall into what promises to be an eventful and interesting winter. I'll outline a few of the events I know of coming soon to a Twin Cities venue later in this column. First, however, I want to take a couple lines to thank my fellow MGWA board members for their service and dedication to our organization.

Our outgoing past-president, **Cathy O'Dell**, has served on the board for three years and has done a stellar job. Most recently, she was instrumental in planning and 'carrying the water' for the fall field trip, which went wonderfully. She even arranged great weather to go with the spectacular fall scenery of the St. Croix valley. Our outgoing treasurer, **Paul Putzier**, has served for two years. In his tenure he has not just followed our finances but has taken a leadership role participating in development of the geoscientist registration rules and has served as an effective link to the American Institute of Professional Geologists, an important sister organization for many of our members.

Ray Wuolo, president elect, has helped to plan both the fall field trip and our datalogger technical session. He will be 'at the helm' in the coming year, and I look forward to working with him through 1997. **Jan Falteisek**, current secretary, continues her service to MGWA begun years ago as newsletter editor.

Tom Clark continues in his role as newsletter editor, recently initiating an editorial board which brings in more people to work on the quarterly newsletter each time.

Jim Almendinger, as advertising rep, has been a welcome addition to our early morning board meetings. **Jennie Leete** and **Sean Hunt** round out the crew, pulling together all the ele-

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Safe Drinking Water Act (SDWA) Reauthorization Signed

by Steve Robertson, Northern Environmental Technologies

A major revision of the Safe Drinking Water Act (SDWA) was enacted in August when President Clinton signed the SDWA Amendments of 1996 into law. This legislation is primarily designed to improve the protection of public health by safeguarding drinking water supplies, and will be wide-reaching in its effect. The legislation was the culmination of many years' work by both water professionals and a variety of public interest groups, and was passed overwhelmingly by both the House and Senate.

The new SDWA will continue to affect groundwater professionals in a variety of ways, chiefly because it will be an important piece of legislation driving the drinking water standard setting process. Since many drinking water supplies rely on groundwater resources, groundwater quality is an important issue addressed by the law. This article will summarize some of the provisions of the new SDWA, particularly those of interest to the groundwater community.

Standard Setting

One of the most significant components of the SDWA has to do with the authority it gives the Environmental Protection Agency (EPA) to establish drinking water standards. This process has been changed substantially from earlier versions of the Act. Some of the interesting changes relate to the manner in which contaminants are selected. Repealed is the requirement that the EPA regulate 25 new contaminants every three years. Instead, EPA will have to identify contaminants that are known or anticipated to occur in drinking water and that could require regulation to safeguard public health. The EPA has discretion to regulate five such contaminants every five years. EPA's decision must be based on the following:

- is the contaminant of interest a likely health concern?
- does the contaminant occur or is it "substantially likely" to occur at levels of health concern?
- does regulation present an opportunity for public health protection?

Standards will continue to be set at the feasible level as in the current law. That means EPA must consider best available technologies (e.g., for mitigation and for detection), taking capital and operation/maintenance costs into consideration. Before any new standard is set, EPA must conduct a cost-benefit analysis that may warrant setting the standard at a less stringent level than feasible, if the benefits justify the costs. The drinking water standards set by EPA generally take the form of maximum contaminant levels (MCLs). It should be noted that at the state level, the setting of health risk limits (HRLs) will be unaffected by the provisions of the new SDWA.

The SDWA identifies several specific regulatory provisions relative to the

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President's letter, cont.

ments and "making them so", ensuring that all gets done. I especially want to recognize the work Jennie has done coordinating the fall technical meeting; well done!

In 1996, the MGWA not only put on quality technical and policy meetings, but also donated funds to several worthy causes, including the Minnesota Extension Service's Water Line and the University of Minnesota Hydrogeology Field Camp.

So, now to the upcoming events:

Jan 7, 1997: John Price, incoming AIPG national president will be in the Twin Cities for a lunch meeting at the **Ramada Inn in Roseville**. This event will be the first official function in this role for this well-known, dynamic speaker. He will be talking about politics and issues relating to geoscience. Cost to attend this meeting is $10, and you don't have to be an AIPG member. Contact Paul Putzier (see number on listing of board members) for more information. The meeting starts at **11:45 a.m.**

Jan 16, 1997: Mark Person, Hydrogeology professor at the University of Minnesota, is this year's National Ground Water Association **Birdsall-Dreiss Lecturer**. He will be giving an excellent lecture on visioning of flow models (see abstract on page 10). The meeting is free, and will be held at **6:30 PM in Pillsbury Hall on the University of Minnesota East Bank (Minneapolis) campus.**

Of course, there will be our spring conference upcoming in March or so. At our spring meetings, we usually focus on policy issues relating to ground water. If you have any great ideas on topics you'd like to see covered here, please get in touch with one of your board members. Remember, too, that you are always welcome to attend board meetings, held the first Thursday of each month at 7:30 AM at the Egg and I, in the southwest quadrant of the intersection of Highway 280 and University.

I look forward to serving during 1997 on the board as your past-president, and urge others to step forward to become more involved in the organization.

SDWA Reauthorization, cont.

standard setting process which are described separately below:

- **Arsenic**. The EPA must develop a comprehensive study plan to assess the health risks of low levels of arsenic exposure, and must promulgate a regulation by January 1, 2001.
- **Sulfate**. The EPA and the Centers for Disease Control are to conduct research on the adverse health effects of sulfate. EPA must decide by 2001 whether to regulate sulfate, and if they do, they must make public notice and provision of alternate water supplies a means of achieving compliance.
- **Radon**. EPA must conduct new risk assessment and cost-benefit analyses before proposing or establishing a radon standard.
- **Disinfectants**. EPA must promulgate regulations for disinfectants and for disinfectant by-products, following a schedule required by EPA as part of negotiated rulemaking with states. For groundwater systems, EPA must determine the criteria that will determine whether a groundwater system must disinfect.

In addition, each time EPA sets a new standard, it must provide a list of applicable treatment technologies that may be used to reduce levels of the newly regulated contaminant to safe levels.

Source Water Assessments

Source water assessments are state programs to 1) delineate the boundaries of the areas providing source waters for public water systems, and 2) identify the origins of the regulated and certain unregulated contaminants in the delineated area to determine the susceptibility of public water systems to such contaminants. The new SDWA specifically calls on EPA to publish guidance governing the source water assessment program within 12 months. States will then have 18 months to conduct the assessments. These assessments must include a delineation of assessment areas and must identify contaminants for which monitoring is required that may present a threat to public health. The main incentive for states to complete the source water assessments is to qualify for a program whereby they can offer community systems relief from some of the SDWA's general monitoring requirements.

In Minnesota, the source water assessment provisions will affect the wellhead protection program administered by the Minnesota Department of Health by accelerating the time frame within which preliminary source area assessments will have to be made and by forcing the preparation of management strategies for systems supplied by surface water.

Monitoring

States may provide interim relief to the monitoring requirements to community systems serving populations of 10,000 or less, for contaminants that are not detected during initial monitoring and are not likely to be detected by further monitoring. This provision specifically excludes microbials, disinfectants, disinfectant byproducts and corrosion byproducts.

States may gain the authority to grant permanent relief from the monitoring requirements by obtaining EPA approval for their source water assessment program, and then only if the alternate monitoring requirements still assure compliance with and enforcement of all applicable national primary drinking water regulations. The same contaminant-specific exclusions apply to the permanent program relief provisions as to the interim relief provisions.

As a primacy state, Minnesota already has the authority to grant monitoring relief under certain conditions. Added to these conditions by the new SDWA is the requirement to assure that a source water assessment is completed for each respective water supply system within the time frame established by EPA. Minnesota's program aims to target monitoring toward real, identified needs, and thus is flexible in providing relief from general requirements.

Consumer Confidence Reports

Community water systems will be required to prepare an annual consumer confidence report on the source of their drinking water and the levels of contaminants found in drink-

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ing water. The report is to be sent to all customers by mail. The report is required annually, and must include the following: 1) information on the source of the drinking water, 2) brief definition of terms, 3) if regulated contaminants are found, the MCLG, MCL and the level found, 4) if the MCL is exceeded, information on health effects, and 5) information on levels of unregulated contaminants (if required by pending EPA regulations).

Funding

So, who will be paying for these new programs plus the SDWA's many infrastructure enhancement requirements (omitted in this brief summary)? Most costs will be borne by the individual systems; the reauthorization established the following:

1) Capitalization grants to the states with annual appropriations through 2003. The states will use these grants to create state revolving funds (SRF), which are primarily intended as a pool of low-interest loan funds available for water supply systems to comply with the SDWA. Nationally, the appropriation is about $9.6 billion, of which Minnesota's share this year is approximately $42 million. 2) Groundwater protection grants will be made for groundwater protection initiatives. $15 million per year is authorized for FY 1997 to FY 2003. 3) Drinking water research. For FY 97 to 03, $26.6 million per year is authorized. 4) Other programs and initiatives, many of which are earmarked for specific projects.

Other Programs

The SDWA Amendments of 1996 also include provisions covering drinking water system capacity (technical, financial, and managerial), operator certification, exceptions for small systems, and various miscellaneous requirements. Those curious about the new SDWA may obtain additional information at the following web sites:

Association of Metropolitan Water Agencies: www.amwa-water.org

American Water Works Association: www.awwa.org

National Rural Water Association: www.cais.net/nrwainfo

Environmental Protection Agency: www.epa.gov

The primary objectives of the MGWA are:

- Promote and encourage scientific and public policy aspects of ground water;
- 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 Board Meeting Minutes

Meeting Date: August 1, 1996
Place: Egg & I, University and 280, St. Paul, MN
Time: 7:30 a.m.

Attending: Cathy O'Dell, Past-President; Ray Wuolo, President-Elect; Jan Falteisek, Secretary; Jeanette Leete, WRI; Tom Clark, Newsletter Editor; Jim Almendinger, advertising; Paul Putzier, Treasurer.

- Approval of Minutes — Ray Wuolo called the meeting to order at 7:30 a.m. July Board minutes were approved.
- Publication of Minutes — Tom Clark suggested the minutes be published in the newsletter. The Board directed Tom to publish the minutes, summarized if necessary.
- Anniversary t-shirts and mugs — Jennie reported that t-shirts would be ready on August 2nd and would sell for $13. Ceramic mugs had been ordered but were not yet available; they would sell for $7. Both can be ordered from WRI (sales tax on the mug and shipping extra).
- Fall Field Trip — Cathy O'Dell reviewed preparations for the Fall Field Trip. Costs and arrangements were reviewed. Lunches will be catered and the first day will end in Stillwater for dinner onboard a boat. The field book still

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1996 Board of Directors

1996 MGWA-AIPG Fall Field Trip a Big Success

This year's field trip was held September 13-14 and once again was blessed with ideal weather—sunny skies with temperatures in the low 70s. Two buses provided transportation for the approximately 75 who attended. The trip featured the geology and several environmental resource projects in the seven county Twin Cities metropolitan area. Variety was a feature of the two days, from geology of the St. Croix River valley to the engineered tunnel in the St. Peter Sandstone underneath the University of Minnesota's Minneapolis campus and from observation of the causes and effects of lake level fluctuations on Big Marine Lake in Washington County to observation of a calcareous fen in the Minnesota River valley in Carver County.

Day 1

The first stop Friday morning was at the offices of the U. S. Geological Survey in Mounds View where Jeff Stoner gave an overview of the water-resources projects the district has underway. Matt Landon discussed results of the Management Systems Evaluation Area (MSEA) near Princeton on the Anoka sandplain. The northern corn belt sandplains MSEA has satellite areas in North and South Dakota and Wisconsin and is designed to study the effects of modified and prevailing farming systems on water quality in sandy soils. Of the three major crops studied—corn, soybeans, and potatoes—potatoes are hardest on ground water, allowing the most nitrate to move deepest into the soil profile. Jim Stark concluded the presentation by discussing the Upper Mississippi River Basin NAWQA (National Water Quality Assessment Program) which is investigating nonpoint and point-source water quality issues in the basin over an extended time period. Factors such as natural ground water chemistry and climate are used to assess contamination of water by runoff from population centers and agricultural activities.

From the Mounds View office, it was a five-minute bus ride to the Twin Cities Army Ammunition Plant (TCAAP), site of the largest recovery system for contaminated ground water in Minnesota. TCAAP was built during World War II and operated for about 25 years, supplying that war, and later, the Korean and Vietnam conflicts with 16.5 billion rounds of ammunition. Ground water contamination originated from disposal sites, transmission lines, and production spill areas. In addition to contaminating the soil at TCAAP, contaminants reached ground water and slowly spread off-site, expanding to affect the New Brighton city water supply. Contaminants consisted mainly of solvents used to clean metal parts, heavy metals from rifle ammunition and artillery shells, and PCBs used in electrical transformers and cooling oils. Hydrogeologists Dan Sola of Conestoga-Rovers and Bill Johnsen of Wenck Associates gave an overview of the treatment system the Army has installed to extract contaminants from the ground water. Since 1986 when treatment began, 90 tons of contaminants have been removed from ground water and an additional 125 tons removed from soils in the source areas at the TCAAP site.

Todd Petersen, Minnesota DNR Waters Division, comes prepared to hit the field.

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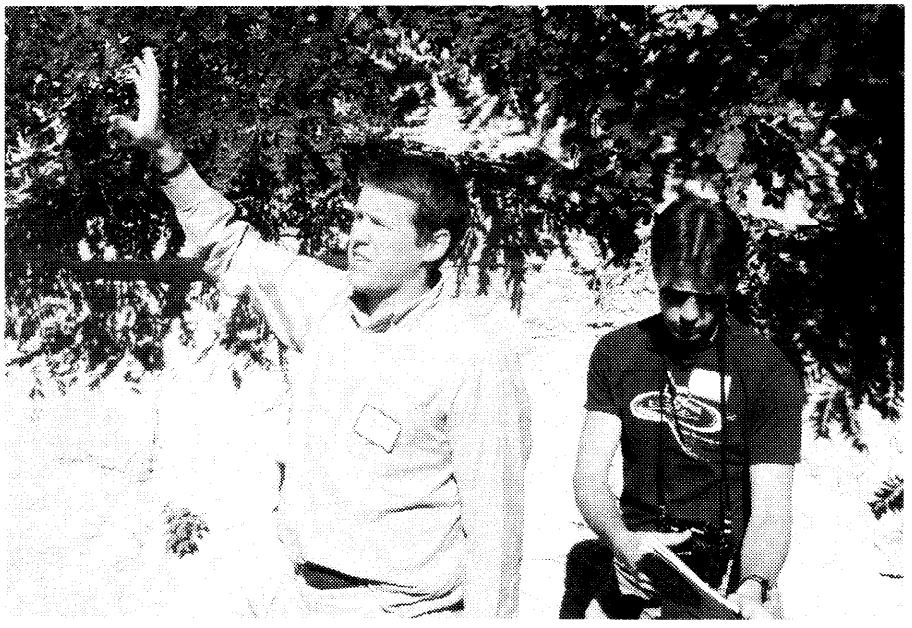
MGWA Board of Directors Minutes, cont.

needs to be prepared. Cathy reported that the USGS was willing to host a half-day program at its office. Cathy then described the tentative stops for both days of the trip. Jennie will do a flyer for the field trip.

- Newsletter— Tom will get copy for the next newsletter to Jennie by Aug. 16th.
- Charitable Giving— Ray reported on charitable giving decisions, directing Paul to send $250 to MN Water Line. Cathy will send a letter to colleges and universities soliciting scholarship applications for field camps.
- Earth Science speakers pool— Ray reported on the development of an organization for earth science education, functioning as a speakers pool and possibly managed by the Community Resources Pool.
- Fall Meeting— Ray reported that the fall meeting will be on data logging. He said he was contacting companies and was investigating possible coordination with a major lakes conference this fall. He is also working on finding a suitable facility for the program.
- Next meeting— September 5th, 7:30 a.m. at Egg & I.
- Meeting adjourned 8:35 a.m.

— Respectfully Submitted, Jan Falteisek, MGWA Secretary



Bob Tipping, Minnesota Geological Survey, describes the Mazomanie Member of the Franconia Formation at the Boom Hollow wayside stop, while John Seaberg of the Pollution Control Agency checks his notes.

The paddle-wheeler Andiamo awaits hungry field-trippers for an evening dinner cruise on the St. Croix River.

The stop before lunch took us to Big Marine Lake in Washington County, noted for its large lake level fluctuations in recent years. Ron Lawrenz, Director of the St. Croix Watershed Research Station whose home overlooks the lake, and Jim Almendinger, Associate Scientist at the Research Center who studied the lake for USGS, explained the reason for the fluctuations and what is being done to control lake levels and prevent flooding of lake shore properties. A hydrogeologic study of the lake showed that fluctuation of water levels is controlled primarily by ground water discharge to and seepage from the lake. Changes in the potentiometric surface of the bedrock aquifer beneath the lake appear to have only a minor effect on the lake level. Lake levels are currently controlled by an outlet structure at the south end of the lake.

From the lake, it was a short trip to the St. Croix Watershed Research Station, where box lunches were served and tours of the station were given. The station, part of the Science Museum of Minnesota, supported the work of more than a dozen scientists in 1995. A new lab is being outfitted and the station is developing a state-of-the-art Geographic Information System (GIS) to aid researchers. As lunches were being finished, John Seaberg of the Minnesota Pollution Control Agency (MPCA) gave an outdoor lecture on geology of the St. Croix Valley and its relationship to the Twin Cities Area Ground Water Model. From there, it was off to a number of outcrop stops to view the geology John had previewed.

The first outcrop stop featured the Mazomanie Member of the Franconia Formation at the Boom Hollow wayside off Highway 95 north of Stillwater. Bob Tipping of the Minnesota Geological Survey, who is a member of a team studying the Franconia in far southeastern Minnesota, described the depositional history of the formation and contrasted the exposure here with outcrops in the southeast study areas. From there, it was on across the St. Croix River to Hudson, Wisconsin to view several outcrops lower in the geologic column, the Ironton Sandstone and the Birkmose Member of the Franconia Formation. The final stop was back in Stillwater to look at the contact between the Prairie du Chien and Jordan formations. The group then had about an hour to explore Stillwater before enjoying dinner and a cruise on a St. Croix river boat.

Day 2

Saturday's first stop was in Carver County north of the Minnesota River to view Seminary Fen, containing one of the rarest wetland plant communities in Minnesota. The 600-acre site consists of calcareous seepage fen, wet meadow, emergent marsh and shrub swamp, bordered by maple-basswood forest and oak brushland on the bluff ad-

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— Jim Almendinger, Research Scientist at the St. Croix Watershed Research Station, explains the hydrogeology of Seminary Fen.

jacent to the wetlands. Jim Almendinger and Jennie Leete provided a fen tour and an overview of the importance of maintaining the hydrologic integrity of a fen system. Seminary Fen is especially endangered because it is controlled by at least 14 landowners and the recharge area is in a part of Chanhassen which is being rapidly developed.

The next stop was several miles down the Minnesota River on the south side to look at the Shiely Quarry, being developed in the Shakopee Dolomite of the Prairie du Chien Group. Ray Wuolo of Barr Engineering described the operation. The rock is used primarily as an aggregate in building materials and concrete. Shiely typically mines rock from March through November and produces up to six million tons per year. Since the current quarry floor is nearly 50 feet below the water table, surface and ground water inflows from the winter must be pumped out, beginning in late February or early March, before quarrying can resume. It takes approximately a month of pumping at 10,000 gallons per minute to dewater the quarry so mining can begin. Ground water continues to flow into the quarry during the mining season, primarily along bedding plane fractures in the dolomite.

— Bill Johnsen, Hydrogeologist with Wenck Associates, describes the Cedar Lake wetlands restoration project.

From Shiely Quarry, the buses headed north to the day's lunch stop at Cedar Lake in Minneapolis and a view of reconstructed wetlands being developed upgradient of the lake. Cedar Lake and lakes further downstream in the Minneapolis Park System's chain of lakes are increasingly threatened from the effects of intensive public use and urbanization in general. The central strategy in creating wetlands is to filter and capture nutrients. An added benefit is the natural habitat for birds and animals that wetland vegetation provides.

Next, it was on to East River Parkway, south of the Minneapolis campus of the University of Minnesota, to view bedrock exposures of the Platteville and Glenwood Formations and the St. Peter Sandstone, the first bedrock encountered beneath much of the Twin Cities area. Again, John Seaberg capably provided the narration as the group navigated the steep cliffs along the Mississippi River. Our final stop, just a short distance north on the campus itself, was by many accounts, unique among any in recent fall field trips. It featured a tour of the Minnesota-Rann Underground Test Room, excavated into the St. Peter Sandstone about 75 feet below the surface. The room was constructed in the 1970's to develop a design method for flat roofs in bedded formations and provide a demonstration of safe and sound underground space. Results of instrumentation of the test room have since been applied to tunnel and mine applications throughout the country. The tour was facilitated by Charles Nelson, who was a university faculty member when the room was constructed, now head of the consulting firm, CNA Associates.

Thanks to the many who helped make the field trip a success, especially Cathy O'Dell of MGWA and Bill Johnsen of AIPG, this year's coordinators. Once again, Sean Hunt did an excellent job of capturing some of the highlights on film. If you have any ideas for next year's trip, or would like to help out, just let any of the MGWA or AIPG officers know.

DNR Waters and MGS Hold Atlas Workshop/Field Trip

The Minnesota DNR, Division of Waters, and Minnesota Geological Survey, in cooperation with Fillmore County, presented a workshop on October 10, in use of the recently-published Fillmore County Geologic Atlas. The workshop included a field trip to showcase Fillmore County geology and hydrogeology as depicted in the atlas. The day's program was attended by an audience of over 50, among whom were teachers, well drillers, county commissioners, and ground water scientists from the state and local level. The Forest Resource Center at Lanesboro was the headquarters for the workshop. The morning session featured an overview of the geology and hydrogeology of Fillmore County and a hands-on workshop in how the atlas can be used to address real environmental issues such as facility siting and ground water protection. After lunch, Dr. Calvin Alexander, University of Minnesota Department of Geology and Geophysics, and Jeff Green, Regional Hydrologist with the DNR's Rochester Regional Office led a stimulating field trip featuring stops at a type-exposure of the geologic column of southeast Minnesota, numerous sinkholes, springs, and other aspects of karst hydrogeology. The Fillmore County Atlas is available from the Minnesota Geological Survey, Publications Division (612-627-4782).

Hydrogeologist Tim Thurnblad of the Minnesota Pollution Control Agency stands in a 75-meter-wide sinkhole one mile east of Fountain, MN. The sinkhole is adjacent to the Root River Recreational Trail and is part of an interpretive display on sinkhole formation developed by Minnesota DNR.

Reminder to Vote for New Officers and Renew Your MGWA Membership

Please remember to vote for a President-Elect and a Treasurer by completing the 1997 Officer Ballot which will be enclosed in a separate mailing with your invoice for your 1997 MGWA membership dues. Your annual member dues will be $20 for professionals and $15 for students. The MGWA Membership Directory, a valuable reference and networking tool for those interested in ground water issues in Minnesota, is available for an additional $7 and is mailed in late Spring to members who order it. We again solicit your donations in two areas: donations to help cover the extra cost of recycled paper, and donations to help fund scholarships for students studying in hydrogeology and related fields. There is a convenient place at the bottom of your dues statement to elect either or both these options. Please get your dues in as soon as possible after receiving your invoice to make our business manager's job a little easier and help speed production of the 1997 directory. Thanks, and don't forget to vote!

1996 Ground Water Protection Council Forum Held in St. Paul

Over 200 ground water scientists and policy makers from across the country attended the Ground Water Protection Council's annual forum, held in St. Paul, September 22-25, 1996. The forum was billed as a stakeholder conference on ground water, watershed, source water, wellhead protection and underground injection control. The forum began with business meetings and a Wellhead Protection Workshop. A day and a half of breakout sessions and technical papers on the above topics were presented, and the last day featured a field trip to view several wellhead protection programs in action. Stops included the city of New Brighton's water treatment system, the second of two treatment plants that contain and remove solvents introduced into the aquifer by the Twin Cities Army Ammunition Plant during the 1940's and 50's. After the lunch stop, where the Minnesota Pollution Control Agency's Ground Water Monitoring and Assessment sampling protocol was demonstrated, the group moved on to the Management Systems Evaluation (MSEA) project near Princeton to view how the impact of various tillage systems and combinations of fertilizer and pesticide applications affect shallow ground water beneath sand plain soils. For information on joining the Ground Water Protection Council, contact the GWPC, Attn: Member Services, 827 NW 63rd St., Suite 103, Oklahoma City, OK 73116 or call 405/848-0690.

Newsletter Management Team News

1997 Editorial/Publication Submittal Deadlines

The Newsletter Management Team is up and running! We've met three times since August and are piloting the concept with this issue in anticipation of making the team fully operational in 1997 (hopefully with some additional members). The feature article on the Safe Drinking Water Act reauthorization in this issue was written by one of the newsletter team members, Steve Robertson.

Jan Falteisek, known to many members as editor of this newsletter for a number of years, is walking the university/college beat.

Jim Lundy is working on reinstituting the Calendar feature of the newsletter from a few years back. Each of us will be coordinating production of one of the quarterly issues next year.

We need feature articles for 1997! These normally need to be lined up several months in advance, so if you have an article you think would be of interest to Minnesota's ground water professionals, give one of us a call.

Jan Falteisek
Minnesota Department of Natural Resources
(612)297-3877
jan.falteisek@dnr.state.mn.us

Steve Robertson
Northern Environmental
(612)635-9100
SRobert156@aol.com

Jim Lundy
Minnesota Pollution Control Agency
(612)296-7822
jim.lundy@pca.state.mn.us

Tom Clark, Editor
Minnesota Pollution Control Agency
(612)296-8580
tom.clark@pca.state.mn.us

Newsletter editorial and publication submittal deadlines for 1997 are:

Volume 16, Number 1; March 1997
Submission of articles to the editor—2/7/97
Submission of copy to the publisher—2/14/97

Volume 16, Number 2; June 1997
Submission of articles to the editor—5/9/97
Submission of copy to the publisher—5/16/97

Volume 16, Number 3; September 1997
Submission of articles to the editor—8/8/97
Submission of copy to the publisher—8/15/97

Volume 16, Number 4; December 1997
Submission of articles to the editor—11/7/97
Submission of copy to the publisher—11/14/97

Newsletter Advertising Policy for 1997

Display ads:

		Quarterly Newsletter	1996 Membership Directory
Size	inches H x V	Annual Rate 4 issues	Annual Rate 1 issue
Business Card	3.5 x 2.3	$60	$45
Quarter Page	3.5 x 4.8	$110	$90
Half Page	7.5 x 4.8	$205	$170
Full Page	7.5 x 9.75	$385	$325
Inside Cover	7.5 x 9.75	Not Available	$360

Classified ads:

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

E-Mail notices:

A one-time e-mailing to the membership costs $10 for an individual (e.g. seeking a job), and $50 for an organization (e.g., announcing a job opening). The advantage of e-mail is the speed of dissemination.

The Advertising Manager has final determination on the acceptance of materials submitted. There are no commissions on ads. Advertising copy must be received by the publications deadlines: 14 February, 16 May, 15 August, or 14 November. Since we do not do any art or camera work ourselves, and we reuse copy from issue to issue, your copy should be a photostat of your art work at the exact insertion size. Photostats give the highest quality print reproduction. If a photostat is not available, high-quality copies of the ad on plain paper must be submitted for each issue published (e.g. four copies for the quarterly newsletter).

Please make checks payable to the "Minnesota Ground Water Association" or "MGWA." Direct your orders and questions concerning advertising rates and policy to the Advertising Manager:
Jim Almendinger, MGWA Advertising Manager, c/o St. Croix Watershed Research Station, Science Museum of Minnesota, 16910-152nd St. N. Marine on St. Croix, MN 55047.
Phone: (612)433-5953; *Fax*: (612)433-5924; *E-mail*: dinger@sci.mus.mn.us

Midwest Ground Water Conference Summary

by Jennifer S. Maloney, Minnesota Pollution Control Agency

The Midwest Ground Water Conference held in Lexington, Kentucky this past September was an excellent conference. The highlight was the 15 hour field trip of the Mammoth Cave Drainage Basin lead by Ken Kuehn and Chris Groves of Western Kentucky University and Joe Meiman of Mammoth Cave National Park.

The talks at seven stops leading up to Mammoth Cave gave a comprehensive overview of the geomorphology, land use and hydrogeology of the Mammoth Cave basin. The first stop, after two hours of driving through scenic Kentucky horse farms and wonderful fall colors, was at the Mammoth Inn Park overlook. This provided viewers a broad perspective of a large part of the basin, the land uses (agriculture, quarries, golf courses, residential) and a working vocabulary of the geologic formations we would be looking at during the day. As is typical in karst areas, the lack of surface water was noticeable.

We toured the area where the St. Louis Dolomite creates a landscape of large sink holes and a uvala (a coalescing of sinkholes that was more than a quarter of a mile long with relief of 90 feet in some places). The lunch stop was at Little Sinking Creek where the sinkhole plain and other non-carbonate units meet and a surface water stream disappears underground into the fractured rock. Due to a recent rainstorm in the few days prior to the field trip, we could see that the water in the stream had exceeded its banks. Mud coated the plants that were at least two feet above the creek bank. This example of rapid water level changes is typical of a karst system.

The next stop was a private farm where the owner has implemented best management practices to help improve the water quality of the basin. This farmer had built a concrete containment system surrounding his livestock feeding area and clay lined waste storage area. A lined lagoon contained runoff water. This lagoon is pumped as needed to fertilize fields and the manure is kept until it is applied on the fields. Containment prevents these nutrients from entering into the sensitive karst system and protects the Green River (the ground water discharge point for the basin).

Stop five was the Hawkins River site, an area where two very deep wells have been installed so that their casings pierced the left and right forks of the Hawkins River (an underground river in the Mammoth Cave system). These are unique wells in that cavers can go inside the Mammoth Cave system and see the screened intervals. Information is continuously logged in these wells giving geologists information about water flow after recharge events and about how the geochemistry of the caves changes over time in the Hawkins River.

The sixth site was the Green River where all the water from the basin discharges after traveling for miles. Many springs were evident there with small tributaries that flow directly into the Green River. Both the volume of inflow from the basin and which spring thedischarge shows up in, are functions of the recharge rate. During low flow times, a smaller basin area might drain to one spring, but during high flow times, a larger part of the basin might drain into different springs at other locations. Dye tracing has shown how variable the Mammoth Cave system can be.

The grand finale of the tour was a personalized tour of Mammoth Cave, led by Joe Meiman of the Park Service. The cave was entered through the original Historic Entrance. The cave was used during the war of 1812 as a mine for "saltpeter", an ingredient in gunpowder. Archeologists have studied the cave, learning that is has been used by humans for over 4,000 years. Cave art has been a highlight for tourists. In 1972, cavers discovered that Flint Ridge and Mammoth caves were connected, making the cave system the world's longest at 350 surveyed miles. New areas of the cave are still being discovered. While inside the cave, we visited seven different rooms highlighting the geologic sequence; starting in the higher stratigraphic units, the Big Clifty Sandstone, the Girkin Limestone, and down to various members of the St. Genevieve and the St. Louis Dolomites. It is very worthwhile to see the "inside" of an aquifer!

The two days of conference talks that followed the field trip had a series of excellent presentations on karst geology. If interested in reviewing the proceedings, contact the Minnesota Pollution Control Agency Library.

Metropolitan Area Ground Water Protection Conference Well Attended

MAGWA Receives Award

The October 21, 1996 Ground Water Protection Conference, sponsored by Hennepin County, the Metro Area Ground Water Alliance (MAGWA) and the Minnesota Board of Water and Soil Resources, was attended by nearly 100 state and local officials and consultants interested in ground water protection issues in the seven-county Twin Cities Metropolitan Area.

The focus of the conference was on use of ground water flow models and local wellhead protection programs. The noontime lunch speaker, Cindy Kreifels of the Ground Water Foundation, Lincoln, Nebraska, discussed her organization's Ground Water Guardian Program, which has gained nationwide attention.

MAGWA has been named as one of the 1996 recipients of the Ground Water Guardian award, and will be honored along with other communities and organizations at a conference sponsored by the Foundation in Oak Park, Illinois in late November.

Geoscience Rules Status Update

The State Board of Practice established a Geoscience Task Force, which was headed by Jim Balogh. Ph.D. (Geoscience Board Representative for Soil Scientists). The meetings were also attended by Jane Willard (Geoscience Board Representative for Geologists). Other Committee members were from the public and private sectors.

The Committee was asked to provide a written definition of the core courses geologists and soil scientists must meet to be considered for professional licensure. Owing to the diversity of names/titles for similar curricula, these definitions will be helpful to the Board, which performs the initial screening of applications. Subtask groups were established to tackle the definition issue for each of the two professions currently defined under the Geoscience Bill. Dr. David Southwick, Jane Willard, Mike Convery, Rob Wahlstrom and Terry Swor served on the subtask group. The process included reviewing the newly implemented Wisconsin Rules definition of core courses and curricula.

Progress:

1. Dr. Southwick submitted the finalized list of degrees and core courses for inclusion in the rules.

2. The rules have been finalized by the Task Force.

3. The combined document was submitted to the Rules Enforcement Committee of the State Board on Oct 18, 1996. This Committee reviewed and finalized the document for the State Board meeting on Nov 20, l996.

4. At press time, the Board had just approved the rule for public noticing. The document will be published for public comment in the State Register. If less than 25 written letters of concern/clarification are received by the Board, then the rules will be automatically accepted. If more than 25 are received, the rules will have to undergo the public hearing process.

If the process goes as hoped, it is possible the "grandparenting" process could start near the first of the year.

Rob Wahlstrom and Terry Swor have also been attending the Joint Practices Committee, which meets once a month. Two representatives from each profession are on the Committee and it is designed to promote a cooperative spirit between the professions represented by the Board. Geologists are duly recognized as a practice controlled by licensure.

1997 Bridsall-Dreiss Distingushed Lecture Abstract

Basin-Scale Hydrogeological Modeling: Problems, Solutions and Applications

January 16th, 1996, 6:30 p.m., Pillsbury Hall, University of Minnesota, Minneapolis Campus

Mathematical modeling of coupled groundwater flow, heat transfer, and chemical mass transport at the sedimentary basin scale has been increasingly used by Earth scientists studying a wide range of geologic processes including the formation of excess pore pressures, infiltration-driven metamorphism, heat flow anomalies, nuclear waste isolation, hydrothermal ore genesis, sediment diagenesis, basin tectonics, and petroleum generation and migration. These models have provided important insights into the rates and pathways of groundwater migration through basins, the relative importance of different driving mechanisms for fluid flow, and the nature of coupling between the hydraulic, thermal, chemical, and stress regimes. The descriptions of basin transport processes, solution methods employed, and the application of a basin-scale model to the Rio Grande Rift is the subject of this lecture. Special considerations made to represent coupled transport processes at the basin scale through geologic time are emphasized.

— Mark Person, Gibson Hydrogeology Chair, Assistant Professor

Polluted Well Water Linked to Six Indiana Miscarriages

Three Indiana women who miscarried a total of six times in two years might have been affected by water polluted due to a hog farm, according to the Centers for Disease Control and Prevention (CDC).

The women were drinking water that contained high levels of nitrate, which is present in animal and human feces. The women, who miscarried between 1991 and 1993, lived within a few miles of one another in LaGrange County, a farming community in northeast Indiana.

A fourth woman who lived 10 miles away from the other women suffered two miscarriages in 1994. She was found to be drinking well water contaminated not by a hog farm but by the family's septic system.

All four women changed their drinking water and have since given birth, CDC said. "We found the women who had miscarriages had wells closer to the hog farm than the women in the area who had term deliveries," said Michele Lynberg, a CDC official.

About 13 million U.S. households get their drinking water from private wells. "The CDC recommends that anyone with a private well evaluate the quality of that well periodically," Lynberg said.

— reprinted from the Aquifer, 9/96

1997 Hydrogeology Field Camp

The tentative schedule for the 1997 hydrogeology field camp is Thursday, July 31 through Wednesday, August 20. Announcements and further details will be available after the first of the year. For further information, contact:

Dr. E. Calvin Alexander
University of Minnesota
Department of Geology and Geophysics, 106 Pillsbury Hall
310 Pillsbury Dr. SE
Minneapolis, MN 55455
(612)624-3517
(612)625-3819 (fax)

New from the USGS

Strobel, M. L. and G. N. Delin, *Analysis of hydrogeologic properties in the Prairie du Chien-Jordan aquifer, Shakopee Mdewakanton Sioux Community, southeastern Minnesota,* U. S. Geological Survey Open File Report.

Stark, J. R., W. J. Andrews, J. D. Fallon, A. L. Fong, R, M. Goldstein, P. E. Hanson, S. E. Kroening, and K. E. Lee, *Water Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin—Environmental Setting and Study Design,* U. S. Geological Survey Water Resources Investigations Report 96-4098.

Andrews, W. J., J. D. Fallon, S. E. Kroening, K. E. Lee, and J. R. Stark, *Water Quality Assessment of Part of the Upper Mississippi River Basin, Minnesota and Wisconsin—Review of Selected Literature,* U. S. Geological Survey Water Resources Investigations Report 96-4149.

New Groundwater Catalog Published

The Groundwater Foundation is proud to announce the publication of its new Groundwater Catalog. The Catalog was recently mailed to all Groundwater Foundation members and is available to anyone interested in groundwater education.

New this year is "JUG," Just Understanding Groundwater, a self-contained make-your-own-aquifer kit that comes with many of the components for constructing a model aquifer and conducting experiments. Based on many years of experience with school presentations, as well as on its popular "Groundwater Discovery" TV segments, JUG was reviewed for technical accuracy and field tested with teachers, parents, and kids.

Also new is "Paradise Valley," a problem solving scenario designed to help school and community groups promote dialogue about difficult water issues and build consensus among diverse interest groups. This ready-to-use educational unit comes complete with a watershed map and worksheets. It can be completed in under an hour or over the course of several hours depending on the needs of the user. The development and publication of "Paradise Valley" was supported by the Chevron Corporation.

The catalog also includes new, updated versions of "Making Waves: How to Put on a Water Festival", the Children's Festival Outreach Packet and many other groundwater education materials and products.

To order any of these products or to receive a copy of the Groundwater Catalog, contact the Groundwater Foundation, PO Box 22558, Lincoln NE 68542-2558. Phone: 1-800-858-4844; Fax: 402-434-2742; e-mail: info@groundwater.org

Join the Minnesota Ground Water Association!

If you are reading this newsletter second-hand, we'd like to take this opportunity to invite you to become a member of **MGWA** for 1997. Annual dues are $20 for professional members and $15 for students. Members are entitled to purchase the annual membership directory for $7. Additional donations toward our scholarships and/or the use of recycled paper 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.

Name _____

Affiliation/Employer _____

Work Address _____

City, State, Zip Code _____

Work Telephone Number _____ E-mail _____

Fax Number _____

Home Address (optional) _____

City, State, Zip Code _____

Home Telephone Number _____

Agency Coordination Is Key to Ground Water Monitoring Report Findings

Better interagency coordination was one of the top five priorities identified by the Legislative Water Commission (LWC) in 1994 to improve implementation of the Ground Water Protection Act. Today, the LWC is gone, but the Commission's priorities live on in the Interagency Ground Water Monitoring Coordination Group (IGWMCG), which submitted a report on ground water monitoring to the Minnesota Legislature in September.

The IGWMCG consists of the following agencies and functions: Minnesota Pollution Control Agency (MPCA)— water quality, pollution control permits; Minnesota Department of Agriculture (MDA)— agricultural chemicals, ground water impacts; Department of Natural Resources (DNR)— ground water quantity, water use permits; Minnesota Department of Health (MDH)— well issues, drinking water quality; Land Management Information Center— data management; Board of Water and Soil Resources (BWSR)— education, county water plans; Minnesota Geological Survey— hydrogeology, research; and U.S. Geological Survey (USGS)— data collection and management, research.

During monthly meetings, the group has helped coordinate state and federal monitoring activities, shared data to limit duplication of effort, fostered cooperation, developed public information materials, and determined the content of this year's "Status of Ground Water Monitoring and Water Quality Trends in Minnesota" report. The IGWMCG made recommendations about three types of monitoring: ambient or condition monitoring, regulatory and effectiveness monitoring, and problem investigation monitoring.

Interesting monitoring projects and results are detailed in the report as well as recommendations for the future. Some monitoring must be conducted over decades, not bienniums, so the IGWMCG recommends that the Minnesota Legislature seriously consider dedicating fee-based funding or a portion of the Environmental Trust Fund to support water monitoring. It also recommends more publicity about monitoring efforts, changes in management practices that arise from analysis of data, and development of more detailed information on geology and ground water flow to support monitoring throughout the state.

For more information or a copy of the report, contact Tom Clark, MPCA, at (612)296-8580.

New Environmental Quality Board Report Available

The Environmental Quality Board (EQB) announces publication of a new report, *Saving Resources: Meeting Minnesota 's Water and Wastewater Needs*. Recent surveys suggest more than $1.5 billion will be needed for public water and wastewater systems by 2000. Upgrading substandard private on-site systems could add $1.7 billion.

Saving Resources, prepared by the EQB Water Resources Committee, anticipates rising water and wastewater needs and examines how to prevent and correct water supply and wastewater treatment problems and prudently fund needs.

With federal funds decreasing, there is increased pressure on the state for financial assistance. Both state and local governments need new approaches to safeguard water supplies and ensure adequate wastewater treatment while funding grows tighter.

This report makes recommendations aimed at preventing and correcting problems. State government has a role in addressing these problems but it can't solve them alone. Individuals, local governments and service providers also need to evaluate the recommendations and take action.

For additional information or copies of the report, contact:
Minnesota Planning
658 Cedar St.,
St. Paul, MN 55155
(612)296-3895
(612)296-3698 FAX
http://www.mnplan.state.mn.us

Treasurer's Report - October 1996

— by Paul Putzier

The primary activity in the MGWA check book over the past several months was related to the very successful Fall Field Trip. Although all the income and expenses related to the trip are not in, it appears that the Association will realize a profit in the range of several hundred dollars. At the beginning of October, income for the field trip was $6030.00, and expenses totaled $5648.93. Income from MGWA field trips and workshops allows us to support ground water professionals and students across Minnesota through scholarships and other means.

Expenses not related to the Fall Field Trip included a $300.00 gift to the University of Minnesota Hydrogeology Field Camp. The camp requested MGWA's support to help balance their budget. The camp's budget shortfall resulted, in part, from fewer than expected number of people attending the camp, and a shortfall in course registration fees.

Other expenses included those for the Board of Directors meetings held monthly. Board meeting expenses average approximately $28.00 per month.

MGWA continues to hold a total of $9,000 in certificates of deposit. Several CD's have been renewed over, because the Association's cash flow has been adequate to cover our work. MGWA is always willing to accept donations for general use or in support of specific scholarships. Contact the Treasurer for more information.

The Association's check book balance at the beginning of October was $3,990.38, with no outstanding expenses.

Minnesota Ground Water Association
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