

Minnesota Ground Water Association

www.mgwa.org

Volume 20, Number 3: September, 2001

President's Column

The Value of Ground Water

Jim Stark, MGWA President

It was hot and dry in Minnesota this summer. How did your lawn and garden look? Did you keep up with the watering? Did you take time to calibrate your sprinklers so that you didn't overwater? Do you know how much water you used this summer, or how much it cost? I had to call the city of Roseville to find out that I'm charged \$1.77 per 1,000 gallons. If I watered for 8 hours at 5 gallons per minute it would cost me \$4.25. That's pretty cheap for sprinkling my lawn with drinking-quality water. It makes you wonder whether the costs cover treatment and distribution aside from paying for the resource itself. I guess we are pretty fortunate in the water-rich Midwest.

The theme for the fall MGWA conference (November 6) will be the "Value of Minnesota's Ground Waters". We will learn about the value of water, and ground water in particular, from economic, legal, resource and policy perspectives. Our quality of life, including economic and recreational opportunities, depend, in part, on how our increasingly scarce water supplies are allocated among competing uses. Supply and demand conditions for water change over time. Floods and droughts result in seasonal and annual variations in supply. Water uses are rarely fully consumptive. Consequently, using water for one purpose does not necessarily adversely affect supplies for other uses. A systematic estimate of the economic value of water can provide important information for understanding the role of water in the economy and the potential benefits of allocating supplies to higher-valued uses as supply and demand conditions change.

However, we don't obtain water on an open market that has the flexibility to reallocate supplies in response to changing conditions of supply and demand. Therefore, the economics of our water supplies are not governed through traditional economic principles.

A number of important caveats need to be considered when we think about the value and economics of water. Water has several dimensions including quantity, quality, timing, and location. These factors influence the value of water for particular uses. Quantity is the dimension that is typically considered for estimates of value. Water-quality considerations are not usually captured in most estimates of the value of water. Water's value may also vary widely among different locations because it is expensive, or illegal, to transport water outside of existing channels.

Anyway, these are some things for you to think about as you prepare your lawn for winter. Plan to join us on November 6 as we learn about the rest of the story about the value of water. You will see more about the conference on our web site and in a separate mailer. See you there.

In other news — We are co-sponsoring the Annual meeting of the American Institute of Hydrology. It will be held in Bloomington from October 14-17, 2001. The theme of the meeting is "Hydraulic Science: Challenges of the 21st Century. We have meshed our fall field trip, to the Brainerd area, with conference activities. You can read more about it, and even register, at www.mgwa.org.

Economic information in this article was extracted from: Fredrick, K.D., VandenBerg, T., and Hanson, J., 1996, Economic Values of Freshwater in the United States: Resources for the Future, Washington, DC, Discussion Paper 97-03, 36p.

Capillary Fringe

The "Good Ole Days" are Now

*Gilbert Gabanski, Senior Project Manager/Hydrogeologist, Summit EnviroSolutions**

A while back Tom Clark asked if I would write an article for the MGWA newsletter focusing on the last 20 years of the organization. I'm not sure who figured we had a 20th anniversary this year, this fall we are starting the 20th year, but MGWA was started in October 1982, so the group is 19 this fall. Maybe this is one of those millennium things, but at my age, we have a tendency to use round numbers. Anyway, we talked about MGWA, reminiscing about the past conferences, the newsletter, people who have been officers and volunteers, and what it was like just getting started. I figured after writing reports and other documents for the last 25 years, this would be an easy walk down memory lane. Then the last newsletter came out and front-page news stated that I was writing a "colorful look back" at MGWA.

A "colorful look back," brings to mind many great stories I could tell, but it

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reprinted if appropriate credit is
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such.

Capillary Fringe, cont.

also make me think about the old
story of what it must be like to marry
the famous actress Liz Taylor. Imag-
ine this: you are husband number,
what is it, six or seven, you exchange
vows or whatever newly weds do
these days (sign contracts?), depart
on the honeymoon, sweep her off her
feet, carry her across the bridal suite
threshold, and start thinking: "I know
what I need to do, but how do I make
it interesting?" Well, that should be
enough "color" for the editors and
who wants to listen to a
well-seasoned hydrogeologist (think
old timer) recollecting the "good ole
days." Only, they weren't so good.
Read on.

During the last 20 years technological
advances have exponentially
improved data collection and evalua-
tion. Twenty years ago when John
Fax and I conducted pump and aq-
uifer tests for the MDNR water appro-
priation section, we used the most
sophisticated equipment available at
that time for measuring groundwater
levels in wells. This consisted of
M-Scopes, known for their thick cable
that would get rather stiff in cold
weather with a long lead weight at the
end; and steel tapes you marked with
blue carpenter's chalk or, my favorite,
steel tapes with a popper attached.
(Lunch on me for the first caller under
the age of 45 who can prove they
ever used a popper.) We would turn
on the pump, scramble like you know
what from well to well attempting to
record as many groundwater level
readings as possible in the first 10
minutes. John was the fastest tape
chalker I've ever seen. Back in the
office we would take the data, manu-
ally plot it on log-log paper, overlay a
set of well function type curves on
clear acetate, muck around until a
fatigue factor set in, and finally, claim
we had matched our log-log plot to a
type curve.

Personally, I liked using the modified
Jacob's Method because it eliminated
the type curves. A leap in technology
occurred when Mark Collins, working
as an intern then, provided a few
basic equations programmed on a
magnetic strip, which was manually
fed into a Texas Instrument hand-held

calculator. You still had to enter all of
the data by hand. Good ole days?

Now we use miniscule data loggers
that you calibrate, pre-program, place
in the well, and come back whenever
to retrieve the data. You now down-
load the data directly into the com-
puter, bring up a multitude of
analytical or digital models, run the
programs and let the computer plot
the data in 3-D. The technological
advances in groundwater related sci-
ences have been impressive. We
have better analytical tools, better
methods of evaluating exposure risks,
lab methods that can take us down to
tenths of a parts per trillion, telecom-
munications systems that permit us to
locate and retrieve information and
send messages wherever and when-
ever, and even new techniques for
drilling, designing, constructing, and
even pumping water wells. The
"good ole days" are now!

Technology has changed; there is
more data and information available
and more readily accessible than
ever. In general, things are different
and better. But I don't think the
MGWA has changed. If you asked in
October 1982 when we published the
first newsletter (I still have a copy),
that the MGWA would be around 20
years later and how it would look, I
likely would have optimistically said
yes and thought it would be very dif-
ferent than today. Yet, the MGWA still
is performing the same role that it
was in 1982. Is the MGWA a dino-
saur from the 1980s? A lingering
holdover from the "good ole days?"
Do we still need this organization?

I maintain emphatically that we do
because there is a fundamental char-
acteristic that is the essence of who
we are, something that has not has
not changed — the need to talk to
each other. No matter how far tech-
nology has progressed and will con-
tinue to progress, there will always be
a need to share information and dis-
cuss groundwater topics; there will
always be new issues that need to be
resolved. Think about it, 20 years
ago we did not talk about feedlots,
risk-based cleanup criteria, wellhead
protection programs, or a host of
other issues that have been

— continued on next page

Minnesota Ground Water Association — The First 20 Years

1982: The Minnesota Ground Water Association is incorporated in September and publishes its first newsletter in October. The first Board of Directors includes Gil Gabanski, Minnesota DNR, President; Dennis Woodward, US Geological Survey, Vice President; Kelton Barr, Barr Engineering Co., Secretary; Kent Peterson, US Bureau of Mines, Treasurer; Tom Clark, Minnesota PCA, Membership Chairman; Pat Leonard-Mayer, US Bureau of Mines, Newsletter Editor. The MGWA Fall Meeting is held at William Mitchell College of Law and features Tom Johnson of the Illinois Geological Survey discussing "Waste Disposal and Ground Water Contamination".

1983: MGWA's Winter Meeting expands to a half-day seminar on the

"Legal and Regulatory Aspects of Ground Water Contamination in Minnesota" and is held at the Earle Brown Center on the St. Paul campus of the U of M. Dr. Mary Anderson of the University of Wisconsin is the featured speaker of the Spring Meeting. Her talk is entitled: "Ground Water Modeling: Is It True the Emperor Has No Clothes?" A summer meeting is held at Johnson Screens in New Brighton on the topic, "Drilling, Sampling and Monitoring Well Installation" and includes an afternoon of drilling and sampling equipment demonstrations. MGWA establishes a Public Education Committee led by Pat Leonard-Mayer and Linda Bruemmer.

1984: Gretchen Sabel of Minnesota PCA is elected as Treasurer and Tom Clark is re-elected as Membership Chairman. The January newsletter includes a summary of some of the

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Capillary Fringe, cont.

discussed in the MGWA newsletter and at the conferences.

Way back when I worked at the Minnesota Geological Survey there was a story floating around that the survey director, Dr. Matt Walton, was asked by a legislator during budget talks how much longer would it take for the survey to finish "doing the geology of the state"? As the story goes, Matt responded by asking how long would it take the legislature to finish making laws for the state.

We will never finish studying our groundwater resources, we will never finish settling all of the debates, we will never complete the final policies, and we will never have the answers to all groundwater resource management issues. We will never know the issues that will challenge us 5, 10, or 20 years from now. We will always need to talk to each other and to share our experience and knowledge. We will always need a vehicle to present, discuss, debate, and resolve conflicts and differences.

In the first newsletter I wrote the MGWA "focuses not on one profession, but on one resource: groundwater. The MGWA invites - and

challenges - you to work to solve Minnesota's ground water problems. Bring to the Association your experience and professional pride, but not your prejudices. Be generous enough to teach but willing still to learn and listen."

Twenty years later, this has not changed. This is why the MGWA is strong; and, why each of us need to continually support and participate in MGWA. When you think about it, 20 years is a short interval for groundwater travel times and distances; but it is a critical amount of time when you think about the increase demands and stresses we are placing and will continue to place on this resource. A critical amount of time when you think back at how we "use" and how we can "abuse" this resource.

Thanks to all who over these years helped as officers, volunteers, member of committees, and especially to the entire group that puts together the newsletter. Twenty years and counting.

* *Editor's Note: Gil Gabanski was the first President of MGWA and served in that capacity from 1982-1986.*

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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.

MGWA's First 20 Years, cont.

early hydrogeological work of Thomas C. Chamberlin of the US Geological Survey from the mid-1880's. Association meetings for the year include "The Professional as an Expert Witness", "Modeling Aquifer Thermal Energy Storage", and "Use of Microcomputers for Ground Water Modeling". The April newsletter has a feature on the certification and registration of ground water professionals. The July newsletter solicits nominations for President, Vice President and Secretary of MGWA, as required by the by-laws.

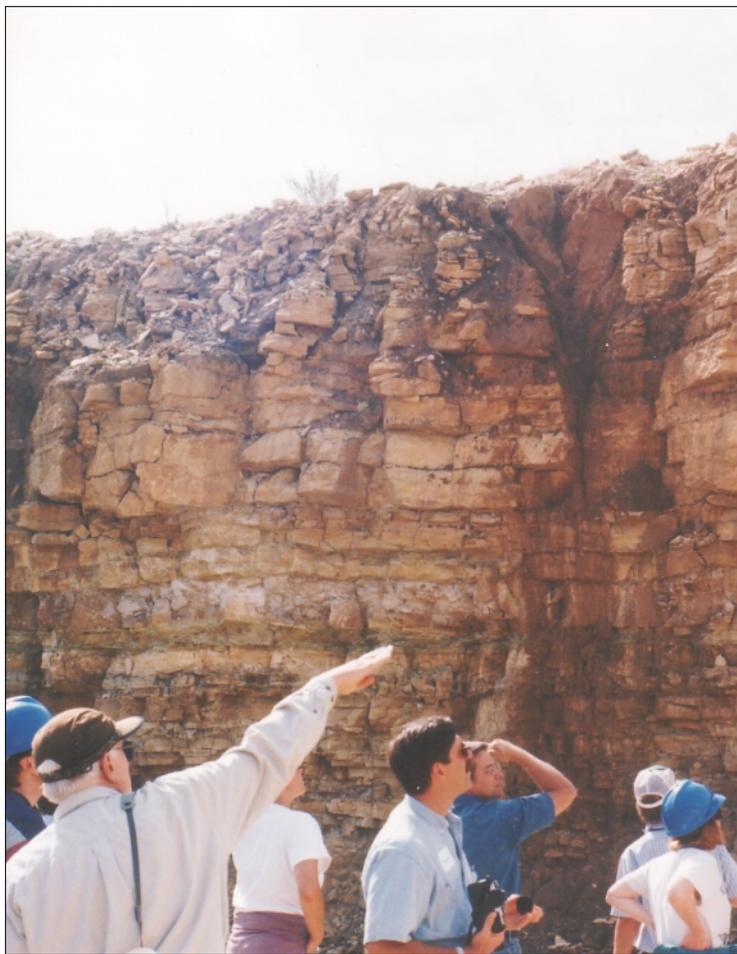
1985: Gil Gabanski is re-elected MGWA President, joined by Jerry Rick, Soil Exploration Co. as Vice President and Jim Stark, US Geological Survey as Secretary. Kevin Powers of Leggette, Brashears and Graham takes over as Newsletter Editor and Jeanette Leete of WRI begins producing the newsletter using Microsoft Word (which came with a mouse in the box) and HP's new LaserJet. The January newsletter has a feature on the emerging issue of LUST—leaking underground storage tanks. The MGWA financial statement shows the association has a cash balance of \$993 as of December 31, 1984. Updated association by-laws are published in the October newsletter. The MGWA hosts the hospitality suite at the Midwest Ground Water Conference, which is held in St. Paul in October. Kevin Kessler of Wisconsin DNR is the guest speaker at MGWA's winter meeting discussing "Implementation of Wisconsin's Ground Water Law".

1986: Gil Gabanski resigns as MGWA President and is thanked by the Board for his vision in being one of the founders of the association and his hard work to make it a success. Jerry Rick takes over as President and the membership is now about 250. Association dues are \$10 for professionals and \$5 for students. The January newsletter has an article about Minnesota DNR's plans to purchase Mystery Cave. The January association meeting is held at Minnesota PCA where about 75 attend to hear presentations on the topic of ground water quality data

analysis. The fall meeting, co-sponsored with the University of Minnesota, Duluth is held at the Life Science Building on campus and features Dr. John Cherry, noted Professor at the University of Waterloo, Canada, and co-author of the pre-eminent hydrogeology textbook of the time.

1987: Rick Johnston, Minnesota PCA is elected President and Pat Bloomgren, Minnesota DNR takes over as Treasurer, which has been combined with the position of Membership

Chairman. Lee Trotta, US Geological Survey, takes over as newsletter editor. Senator David Durenberger announces proposal of a Ground Water Protection Act at a public meeting in Southeastern Minnesota. The May newsletter discusses how the ground water field is booming and hydrogeologists are in demand, especially in the cleanup and remediation areas. Ron Nargang is new Director of the Minnesota DNR Division of Waters and Priscilla Grew is named to head the Minnesota Geological Survey. The fall conference is a seminar devoted to nitrate. The October newsletter has a fresh look as a result of a probono professional redesign at a University of Minnesota workshop on newsletter production and installation of the new VENTURA desktop publishing system at WRI where Jeanette Leete continues to produce the newsletter for MGWA.



Dr. Calvin Alexander, U. of M. Dept. of Geology and Geophysics, points out karst features in SE MN quarry. Fall Field Trip, 9/97. Photo by Sean Hunt.

1988: Linda Lehman, L. Lehman and Associates, is elected President and Gordy Hess, Sunde Engineering is the new Secretary. The spring meeting, held at Winona State University, is co-sponsored with the Minnesota Chapter of the American Water Resources Association, and is titled, "Radium in Ground Water: Origin, Occurrence, Treatment and Health Effects". The drought of 1988 is a hot topic of discussion among hydrologists. The MPCA's Ground Water Protection Strategy is featured in the October newsletter. The St. Anthony Falls Hydraulic Lab celebrates its 50th anniversary.

1989: Bob Karls, Delta Environmental Consultants is the new MGWA President and Don Jakes, Minnesota PCA, the new Treasurer. Passage of the 1989 Ground Water Protection

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MGWA's First 20 Years, cont.

Act is the topic of several newsletter articles and MGWA's fall conference. The Property Transfer Program is gathering momentum at the Minnesota PCA. The by-laws are revised for the first time since 1985, establishing a three-tier progression of President-Elect, President and Past-President, all of whom serve on the Board. Attorney General Hubert (Skip) Humphrey III is named to a national task force to speed environmental cleanups at federal facilities.

1990: Gordy Hess, ERM-North Central, is MGWA's first President-Elect and Bob Beltrame, Donohue and Associates, becomes Secretary. Jan Falteisek, Minnesota DNR becomes newsletter editor when Lee Trotta takes an assignment with USGS in Reston. Cost-share grant programs for well sealing become popular. The spring conference revisits "Field Techniques and Interpretation", while the fall conference tackles "Risk Assessment" for the first time. One of the featured panelists is Dr. Jay Lehr of the National Water Well Association. The MGWA publishes

its first comprehensive membership directory, which includes listing of members alphabetically and by affiliation, as well as an information referral index to services of government agencies.

1991: Gordy Hess becomes President, Sheila Grow, Minnesota Department of Agriculture, is the President-Elect, and Susan Price, HDR Engineering is elected Treasurer. Watershed Research, Inc. assumes responsibility for business management and publications for the association. At the beginning of the year, MGWA's assets are \$19,463. The Spring Conference topic is "Remediation Technologies for the Unsaturated Zone". In June, MGWA joins Twin Cities Geologists and the Minnesota Chapter of AIPG for a hog roast at Bruce Bloomgren's Bar-Nothing Ranch. Fall brings the first annual field trip co-sponsored by MGWA and the Minnesota AIPG Chapter to parts of southwest Wisconsin and southeast Minnesota. By year's end, storm clouds gather over the future of the Minnesota Geological Survey as Governor Carlson has vetoed a line-item of the University of

Minnesota budget that contains funding for MGS.

1992: New officers are: Sheila Grow, President; Larry Johnson, Dames and Moore, President-Elect; and Bruce Olsen, Minnesota Department of Health, Secretary. MGWA celebrates its tenth anniversary. The spring meeting features "Innovations and Updates on Drilling and Well Construction". The Minnesota District Office of USGS moves from downtown St. Paul to Mounds View. The fall field trip travels to northeast Minnesota in September and includes a stop at the Highway 61 Silver Cliff Tunnel, under construction.

1993: Larry Johnson becomes the President and Doug Connell, Barr Engineering is the new President-Elect. Rita O'Connell, MPCA, is the new Treasurer. The Association provides six scholarships of \$300 each to institutes of higher education in Minnesota. The new Director of the State Health Department's Division of Environmental Health is Pat Bloomgren. The spring conference features applications of geographic information systems (GIS) in solving ground water problems. Technical

articles in the newsletter address use of chlorofluorocarbons (CFCs) as ground water tracers and discuss the operation and status of MPCA's Voluntary Investigation and Cleanup (VIC) program. The fall field trip features southwest Minnesota, including Redwood Falls and New Ulm.

1994: Doug Connell assumes the presidency, Cathy O'Dell of Geraghty and Miller is President-Elect and Rich Soule, Minnesota Department of Health, is elected Secretary. Health



Examining sinkholes at the Lewiston Country Club Golf Course, Fall Field Trip, 9/97. Photo by Sean Hunt.

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MGWA's First 20 Years, cont.

Risk Limits (HRLs) for 89 ground water contaminants are adopted as rules by MDH. The spring conference looks at the health effects of landfill gases. The annual Treasurer's Report indicates that total income for the association is \$23,106.67. Dr. David Southwick becomes the eighth director of the Minnesota Geological Survey. The Ad Hoc Committee on Professional Practice for Geologists is gearing up to reintroduce a licensing bill for the 1995 legislative session.

1995: Cathy O'Dell is President, Gretchen Sabel of MPCA is President-Elect, and the new Treasurer is Paul Putzier of RETEC. Tom Clark, MPCA, takes over from Jan Falteisek as newsletter editor. The spring conference topic is Technical Communication with the Public—Ground Rules for Scientists. The fall conference is a short course on isotope hydrology, featuring Drs. Carol Kendall of USGS and Calvin Alexander of the U of M's Department of Geology and Geophysics. Field trippers enjoy perfect fall weather in a two-day trip to the Iron Range. Technical articles in the newsletter feature the Twin Cities Area Groundwater Model, the Ground Water Clearinghouse at the Land Management Information Center, and an article on how to use and apply HRLs.

1996: Ray Wuolo, Barr Engineering, is President-Elect and Jan Falteisek takes over as Secretary. The unelected position of Advertising Manager is established (formerly part of the newsletter editor's duties) and is filled by Jim Almendinger, St. Croix Watershed Research Station. The spring conference looks at "Applied Ground Water Management: Wellhead Protection and Beyond." There are 791 members in the MGWA database.

Technical articles feature DNR's program to locate and seal abandoned wells on state lands and MPCA's ground water monitoring and assessment program. The fall field trip looks at the diverse hydrogeologic issues of the Twin Cities Metro Area.

1997: Paula Berger, Environmental Strategies Corporation is President-Elect and Paul Bulger, MPCA is Treasurer. Under Gretchen Sabel's leadership, MGWA has its first open house for legislators and their staff to raise awareness of the need for ground water protection in the Land of 10,000 Lakes. Technical articles feature springs of the Twin Cities and Winona County sinkholes. The spring conference is an update on the state licensing program for geoscientists, and the fall field trip fills two buses for a tour through the karst country of southeast Minnesota. A team approach is adopted for production of the quarterly newsletter and Leigh Harrod is the new Advertising Manager.

1998: Jim Piegat, Hennepin Conservation District is President-Elect and Jan Falteisek is re-elected Secretary. The DNR-MGS County Atlas and Regional Hydrogeologic Assessment Program continues to make steady

progress in assessing and mapping the state's hydrogeologic resources, and is featured in several newsletter articles. The spring conference focuses on brownfields redevelopment, the fall conference tackles emerging technologies in ground water remediation, and the fall field trip plays "glacial roulette" in east-central Minnesota and north-west Wisconsin. MGWA is one of 30 co-sponsors of the Children's Water Festival, which has now become an annual event.

1999: Jim Lundy, MPCA, is the new President-Elect and Lee Trotta, US Filter, is the Treasurer. A possible link between ground water and Minnesota's malformed frogs is a hot research topic as is the link between naturally-occurring arsenic in west-central Minnesota ground water and human health effects. Consumer confidence reports for drinking water supplies become mandatory under amendments to the Safe Drinking Water Act. The fall field trip is popular as it heads to the North Shore and Gunflint Trail. The Midwest Ground Water Conference returns to Minnesota for the first time since 1985 and

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— Dinner at Rockwood Lodge, Gunflint Trail. Fall Field Trip, 9/99. Photo by Paul Putzier.

MGWA's First 20 Years, cont.

draws 270 to St. Paul for two days of technical presentations and a half-day field trip along the Mississippi River corridor from St. Paul to Minneapolis.

2000: Keeping in the "Jim" tradition of the previous two years, Jim Stark of the USGS is President-Elect. Jan Falteisek is elected to another term as Secretary. The newsletter features articles as diverse as program evolution at the Minnesota Geological Survey to the emergence of MTBE as a ground water contaminant of concern. Jim Lundy, MGWA President, is active in testifying before the House Subcommittee on Ground Water, which is considering possible amendments to the 1989 Ground Water Protection Act. Several local hydrogeologists receive considerable media coverage as a result of the great MSP airport dewatering controversy. The real story is told in several newsletter articles and a Capillary Fringe column. The fall conference considers fine tuning the Ground Water Protection Act and plays to a full house at Earle Brown Center. The fall field trip returns to the Minnesota River Valley for the first time since 1993. Jim Aiken of North Jackson Company takes over as Advertising Manager.

2001: Rob Caho of Bergerson-Caswell is President-Elect and Eric Hansen, Pinnacle Engineering becomes Treasurer. Over 200 pack the Earle Brown Center for the Spring Conference, the largest attendance ever for a MGWA-sponsored event. The MGWA Foundation, Ground Water Education and Membership Committees broaden the scope of

Association activities and involve more members. John Pollock, Frontline Environmental joins the newsletter team from the private sector. Plans are under way for the fall field trip to the Brainerd lakes area and Cuyuna Range, co-sponsored

with the Minnesota Chapter of AIPG. The trip will be held in conjunction with the national meeting of the American Institute of Hydrology, to be held in Bloomington in October.

This summary was compiled by Tom Clark



Examining rock cores at Finland Airforce Base, Finland, MN. Fall Field Trip - 9/99. Photo by Paul Putzier



Group photo of trip to Lower MN River Valley. Fall Field Trip - 9/00. Photo by Tom Clark.

Is Your Drinking Water Protected?

The 1996 amendments to the Federal Safe Drinking Water Act (SDWA) require the Minnesota Department of Health (MDH) to complete Source Water Assessments (SWA) for public water systems in Minnesota. Each SWA must include 1) a delineation of an area which supplies water to the public water supply; 2) a description of the contaminants of concern which may impact the users of the public water supply, and 3) the origin of the contaminants, to the extent practical. The results of the source water assessment must be presented to the public water supplier and made available to the general public.

There are 955 community and 8000 noncommunity public water systems in Minnesota (comprising over 10,000 individual wells). MDH's approach for completing SWAs for each of these public water systems builds on existing efforts to protect public water supplies. The wellhead protection program is one such existing program, and is applied to community and nontransient, noncommunity public water systems that use groundwater. In general, the requirements of the wellhead protection rule exceed the requirements of the source water assessment program. As of August 2001, 101 wellhead protection areas around the state have been approved, and more delineations are added each month. Figure 1 on page 9 shows the approved wellhead protection areas for a portion of the seven county Twin Cities metro area. Associated with each of these delineations is a vulnerability assessment for the wells and aquifer used for the supply. Wellhead protection planning includes an inventory of potential sources of contamination and development of management strategies.

Transient, noncommunity public water supply systems (approximately 8000 in Minnesota) that use groundwater as their source of supply are also covered by the wellhead protection program, but need not delineate a wellhead protection area in the same manner as community and nontransient, noncommunity systems. Instead, transient noncommunity systems must manage an

inner wellhead management zone (IWMZ) that is defined as the area within a 200-ft radius of the well. Management of potential contamination sources in the IWMZ should protect well water users from pathogens and high levels of chemical contamination. Isolation distances from contamination sources specified in the Minnesota Well Code have proven effective in meeting health protection goals.

While most of the public water systems in Minnesota use groundwater, 24 of the state's 955 community water systems and 64 of the 8000 noncommunity systems use surface water and hence will not fall under the wellhead protection program. This is a small but important subset of the state's public water supply systems because it includes some very large systems, such as Minneapolis, Duluth, and Moorhead. Collectively, surface water based public water systems serve over 1.5 million people in Minnesota. The types of surface sources used by community water supply systems and their geographic distribution are very diverse and it has been a challenge to develop a systematic approach to SWA's.

Where a common surface water resource is used, cooperative efforts can be used to streamline the SWA process. Figure 2 on page 10 is a composite summary of the delineated source water assessment areas for the public water supply systems that use the Mississippi River as a source of supply. Depicted are the inner emergency response areas and the outer source water management areas for the cities of St. Paul, Minneapolis, and St. Cloud. The inner-emergency response area is designed to help the public water systems address contaminant releases which present an immediate (acute) health concern to water users. This geographic area is defined by the amount of time the water supplier needs to be notified, shut off the surface water intake, and a "buffer" time limit to accommodate unanticipated delays in notification and shut down. The outer source water management area is designed to protect water users from long-term (chronic) effects related to low levels of chemical contamination or the periodic presence of contaminants at low levels in the

Public Water Systems

Community water supply – A public water supply that serves 25 or more year-round residents or has 15 or more service connections. Examples include municipalities, apartment buildings, manufactured housing developments, housing subdivisions, hospitals, colleges and universities, and correctional facilities.

Nontransient, noncommunity water supply – A public water supply that serves 25 or more non-resident users for at least six months per year or has 15 service connections used by persons other than year-round residents. Examples include schools, office buildings, factories, commercial buildings and industrial parks.

Transient noncommunity water supply – A public water supply that does not meet the definition of a nontransient noncommunity supply but serves water to at least 25 or more persons for at least 60 days a year. Examples include parks, campgrounds, motels, golf courses and highway rest stops.

surface water. Also, this area should protect users from contaminants, such as pathogens, which may 1) ordinarily be present at treatable levels in the source water, and 2) occasionally represent an acute health concern under certain conditions, such as the low stage of the Mississippi River. The entire watershed is an area designed to provide the water supplier with a broad perspective with which to prioritize specific types of lands uses that may impact the water quality of the source water used by them.

Protecting the drinking water source is a wise and relatively inexpensive investment in the community's future. The overall intent of the source water assessment is to provide background information for the community to use in developing a local protection program. The assessment benefits the community by providing 1) a basis for focusing limited resources within the community to protect the drinking water source and 2) a basis for informed decision-making regarding land use within the community.

— contributed by Steve Roberston,
Minnesota Department of Health

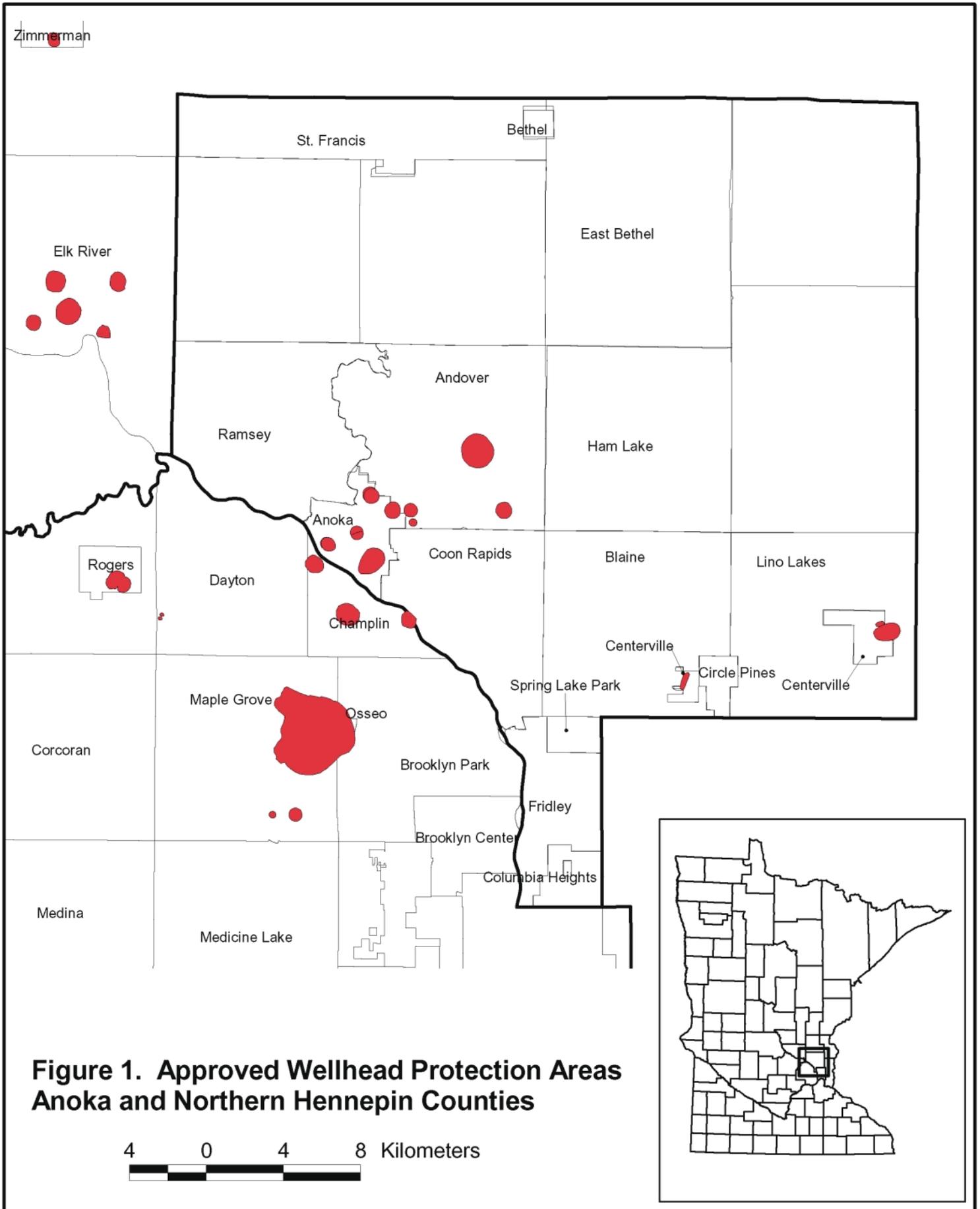
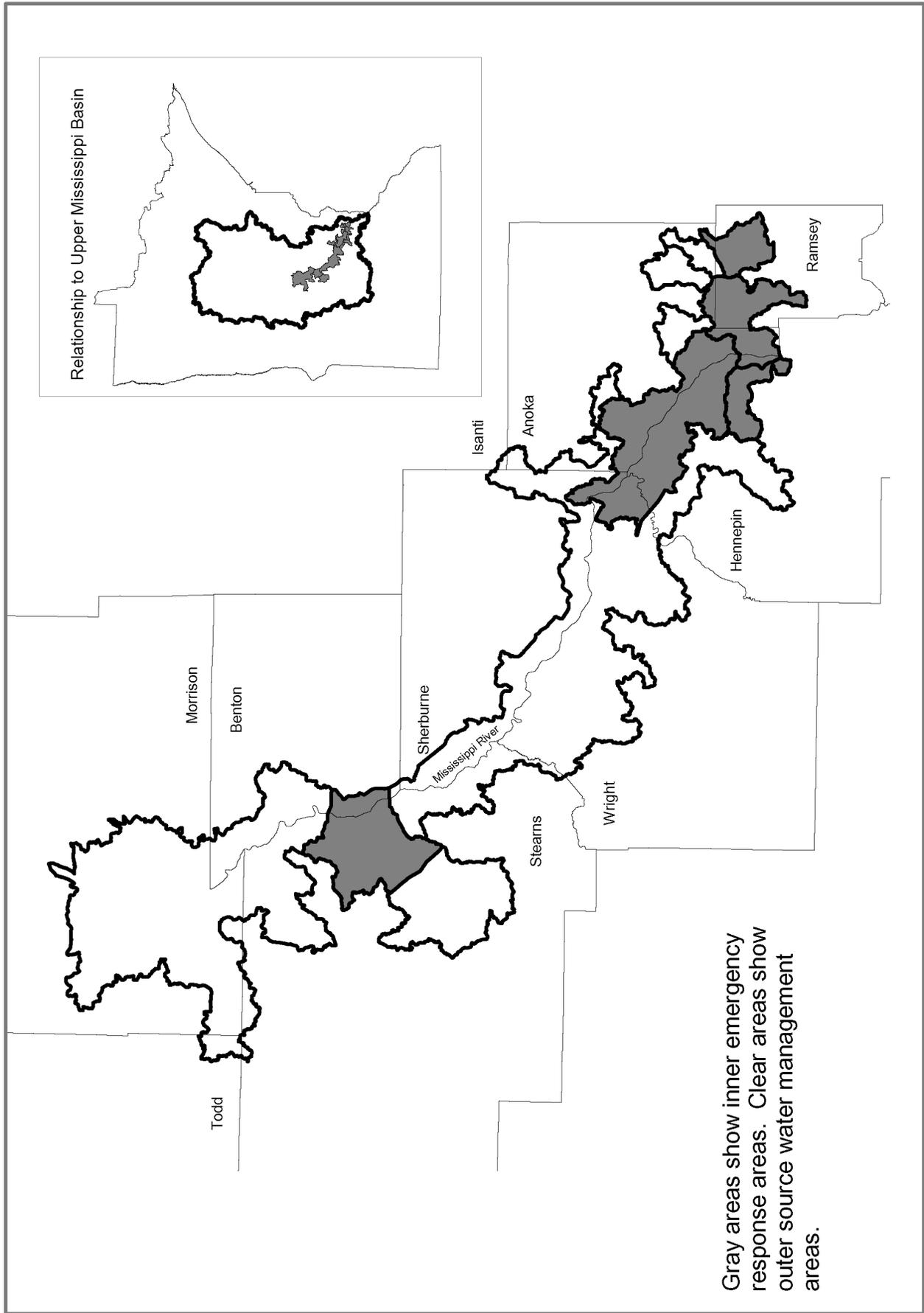


Figure 1. Approved Wellhead Protection Areas Anoka and Northern Hennepin Counties

4 0 4 8 Kilometers

FIGURE 2: COMPOSITE SOURCE WATER ASSESSMENT AREAS FOR THE MISSISSIPPI RIVER



Gray areas show inner emergency response areas. Clear areas show outer source water management areas.

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 2001. Annual dues are \$25 for professional members and \$15 for students. Members are entitled to purchase a paper copy of the annual membership directory for \$7; an electronic version will be available on the website for paid members. Additional donations to the MGWA Foundation will be gratefully accepted.

*Dues paid to MGWA are **not** deductible as charitable contributions for federal income tax purposes. However, dues payments are deductible as ordinary and necessary business expenses to the extent allowed by law. The MGWA Foundation is a 501(c)3 non-profit and donations paid to MGWAF **are** deductible as charitable contributions.*

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

Name _____
Affiliation/Employer _____
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Home Telephone Number _____
Which Address should we use for Mailings and for Directory Listing? _____
Which Telephone Number should we use for Directory Listing? _____

2001 Minnesota Ground Water Association Newsletter Advertising Policy

Display ads:

Size	Inches Hor. x Vert.	Quarterly	2001 Membership
		Newsletter	Directory
		Annual Rate; 4	Annual Rate; 1 issue
		issues	
Business Card	3.5 x 2.3	\$66	\$50
Quarter Page	3.5 x 4.8	\$121	\$99
Half Page	7.5 x 4.8	\$225	\$190
Full Page	7.5 x 9.75	\$425	\$360
Inside Cover	7.5 x 9.75	not available	\$395

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

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

The Advertising Manager has final determination on the acceptance of materials submitted. There are no commissions on ads. Copy must be received by the publication deadlines: 1 February, 1 May, 1 August, or 1 November. Advertisers should submit their material as a digital file in TIFF, JPEG or PCX format at 300 to 600 dpi. A set-up charge will be applied to non-digital ad material.

Please make checks payable to "Minnesota Ground Water Association" or "MGWA." Direct your orders and questions concerning advertising rates and policy to the Advertising Manager: Jim Aiken, Advertising Manager, c/o MGWA, 4779 126th Street, White Bear Lake MN 55110-5910; Phone (952)361-4944 ; jaiken@mn.rr.com.

Kenya 2001

by Jeff Green, DNR Waters,
Rochester

Last year I had the opportunity to travel to Kenya, east Africa, as part of a team from my church in Rochester. My focus was on evaluating water supply options for the Mutulu Hope Center, a church/school/clinic compound east of Nairobi in the Kitui District. A report about that trip appeared in the June 2000 MGWA newsletter. This past March I went back, again as part of a team of people from First Baptist Church. My purpose on this trip was to implement some of the projects that were planned during last year's trip. Those projects included protecting a spring and installing rainwater cisterns.

Marilyn Newman, the director of Special Ministries, the organization that runs the Hope Center, had enlisted the aid of Jim Probst, an engineer with the technical branch of the Africa Inland Mission. Jim and I (e-mail is a wonderful thing!) planned to build a brick and mortar box around the spring with a discharge pipe to a tank below it. The box was designed, along with some planned terracing above it, to keep contaminants out of the spring. The local people could get their water from the tank; in the event the tank failed they could still get water from the spring box discharge pipe. The planning was going well until January when I heard from a member of Marilyn's staff that the spring's owner, who didn't live in the area, had refused to give us permission to work on the property. Time for plan B!

While all this was going on, a Kenyan water prospector with a "hand-held electronic meter" came to the site and located two "underground rivers" approximately 75 feet below land surface that would yield 40 to 60 barrels of water a day (I never did find out how many liters there are in a barrel). Since the area is an old mountain range made up of gneiss and quartzite I doubted the underground river theory. He did, however, hit the elevation of the spring line on the mountain fairly

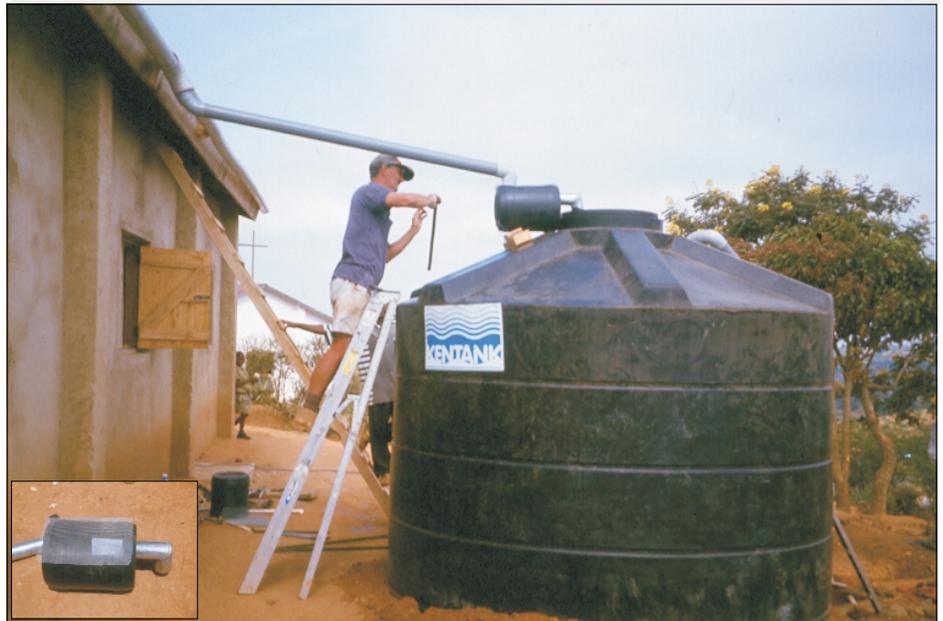
This Newsletter brought to you by:

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Remaining MGWA Newsletter Deadline for 2001

Issue	Copy to Editor	Copy to Publisher
December (Vol. 20 No. 4)	11/09/01	11/16/01



New cistern with flush box. Note gutter from roof that supplies the cistern. Inset shows detail of flush box.

accurately. He proposed that they pay for two wells to be dug, by hand, down to the water. After a number of e-mail volleys and some research on my part I agreed to have my church's water development fund (donations from interested folks) pay for one well. The second site was directly downhill from a pit latrine and was totally unacceptable to me.

We also planned on installing a rainwater cistern. There was one at the Hope Center already, but at 2000 gallons it wasn't enough. So, we ordered a 10,000 liter PVC cistern and had it delivered prior to my arrival. High on my list of things to do while I was there was to design and install a "first flush box" in each of

the cisterns. A "first flush box" takes the first dirty flush of rainwater (the stuff with bird droppings, dirt, leaves, etc.) and discharges it as waste, improving the water quality in the cistern. Neither Jim or the local people had ever used such a device. We were able to build these boxes by using 20 liter cooking oil jugs with a sheet metal flow deflector inside and a screen (for the larger pieces of debris) on the outside. In the bottom of the flush box we placed gravel to filter out debris so the drain hole wouldn't plug. We were able to get our new cistern installed with the flush box and put a flush box on the existing cistern.

— continued on next page

Kenya Update, cont.

I also made sure the hand dug well was going to be properly constructed. The well, when I was there, was down to about 32 feet below land surface. It was about four feet wide and the people digging it were going through gneiss and schist. Their tools were hammers and chisels! They were getting paid 500 Kenya shillings per foot (75 Ksh per dollar); since they were digging about a foot per day they weren't exactly getting rich! We raised their pay to 650 Ksh per foot (divided between three people) which is a decent wage in rural Kenya. Before I left we also clarified how the well was to be constructed. The original plan was to line it with brick and mortar down about twenty feet and then have an open hole. We had a great conversation in English and Swahili between me, Marilyn, the school headmaster, and the chief well digger. We agreed that they would line the well all the way down to water to protect it from human waste from pit latrines. After it is done, a concrete cap will be placed over it and a hand pump will be installed.

The two most frequent questions I get asked about Kenya are "how is the well going?" and "are you going back?" The last news I got from Kenya was that the well diggers had gotten down to 54 feet with about 25

to 30 feet to go. I don't know why exactly their progress has slowed so much. Marilyn Newman returned to Kenya this summer so hopefully she can speed things along. The answer to the second question is more complex. I am not returning next year. Our church isn't sending a team to Kenya next year so it seems like a good time to take a break (we are however starting some projects in Honduras). There also isn't really much for me to do at Mutulu at this time. If Marilyn can convince the spring owner to allow us on his land I may go in 2003. Right now the biggest need is for more cisterns. The water in the tank we put in is has been used up and the tank won't fill again until the November rains come. There is enough roof area left that hasn't been captured to install 4 to 6 more tanks. I don't need to be there to do that work so I am instead raising money to help fund it. Please feel free to contact me (507-285-7429 or jeff.green@dnr.state.mn.us) if you have any questions about the work in Kenya. I do give talks about it, especially to groups that want to donate to the water development fund! All in all, going there has been a rich blessing in my life, and I know that no matter how much I do there, I always gain more in return.

Gasoline Oxygenates and Private Wells

Many observers would agree that with the closure of Santa Monica's Charnock well field in 1996, that city became the "poster child" for the ban MTBE (methyl tertiary butyl ether) movement. Because of the substantial political power wielded by California water purveyors and their trade group, activities aimed at banning MTBE rapidly escalated.

Protecting municipal water systems and the thousands/millions of customers they serve is an extremely important consideration for UST regulators. However, it might be fair to say that if we are concerned about exposures to MTBE (or other common drinking water contaminants), especially at levels above MCLs or other health-based limits, then we should be especially vigilant regarding potential impacts to private drinking water wells.

In some states, concerns about private wells have been the catalyst for legislative efforts to ban MTBE. Incidents on Long Island and upstate New York, for example, were frequently cited during the MTBE legislative debates in that state. In what remains the best study on this topic, the 1998 Maine Department of Environmental Protection's study found MTBE in 15.8% of the 950 private wells they sampled.

The U.S. Census Bureau statistics indicate that in 1990 over 15 million households (around 42 million people) received their water from private domestic wells. Five states have almost 1/3 of these wells—Michigan has over 1.1 million private wells; Pennsylvania, North Carolina, New York, and Florida all have over 800,000.

A recent article in *Environment Science and Technology* (ES&T) noted that 73 million Americans live in areas where MTBE is used in reformulated gasoline (RFG) and estimates that about 6.4% live "near" a gasoline station. Most private wells draw from shallow unconfined aquifers that are susceptible to

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Hand-dug well under construction.

Gasoline Oxygenates, cont.

contamination from a multitude of sources, including USTs.

Little Is Known About Private Wells

A 1997 EPA report on the nation's drinking water infrastructure noted that "very little is known about the degree of contamination at private wells." EPA has just released a follow-up report that states "A lack of monitoring data prevents a comprehensive assessment of the quality of water supplied by private wells."

The 1997 report notes that such wells at best are only tested immediately after they are installed and that 24 states do not even require that level of testing. Few studies have been conducted of private well water quality. Those studies that have been undertaken typically find disturbingly high occurrences of contaminants.

For example, a 1994 Center for Disease Control study of over 5,000 randomly selected private wells in nine Midwestern states showed that over 13% of the wells had nitrate levels above the U.S. EPA MCL. Atrazine, a common herbicide used in corn-growing areas, was found in 13.4% of the wells with 0.2% of the wells exceeding the 3 µg/L MCL. Similar results were observed in a U.S. Geological Survey (USGS) study of wells in the Delmarva peninsula area of the mid-Atlantic states of Delaware, Maryland, and Virginia (Environmental Health Perspectives, 1997).

A 1997 Government Accounting Office report on private wells and community water supplies in California, Illinois, Nebraska, New Hampshire, North Carolina, and Wisconsin found that up to 42% of private wells were contaminated with coliform bacteria at levels in excess of the MCL (as opposed to 3 to 6% of community systems), and that up to 18% exceeded the MCL for nitrate. Limited data were available for chemical pollutants such as pesticides, metals, and volatile organic compounds. The report indicated that contamination with those compounds is rare—only 1 to 2% of wells tested

reported concentrations above federal MCLs.

Several recently published studies provide interesting details about the private well side of the drinking water impact issues. The February 1 issue of *ES&T* featured an article (<http://pubs.acs.org/subscribe/journals/esthag-a/35/i03/html/02mackay.html>) that describes an approach for predicting impacts to wells using the concepts of contaminant-dissolved mass flux.

The authors note that given the limited amount of contaminant mass in a dissolved plume (e.g., a "typical" UST release site might leach about 10-100 grams of dissolved MTBE daily from the residual gasoline source area), coupled with the massive volume of water typically withdrawn by large wells (e.g., 400-900 gallons per minute), that dilution will frequently reduce MTBE concentrations to levels below analytical detection limits and/or below levels of concern. They caution that "...if an impact is defined by the concentration of contaminants in the extracted water, small, private water wells may more often be at greater risk than large municipal systems pumping hundreds to thousands of liters a minute."

In early February the state of New Jersey released its report on the environmental impacts of MTBE. That report noted that they have been monitoring for MTBE in municipal systems for over 15 years and that MTBE (at 0.5-20 µg/L) was present in 15% of those systems; there were no findings over 20 µg/L

The report summarizes USGS studies of MTBE detections in domestic wells in four separate sampling areas (about 30 wells sampled in each). MTBE was present in 43%, 28%, 7%, and 93% (yes 93%!) of those wells. Almost all detections were relatively low, however, as the median concentration detected in each study area was no greater than 1.16 µg/L

Regarding the study area with 93% detections, it was around a lake that received heavy watercraft use, and where the lake water during summer months contained as much as 20 µg/L or more MTBE due to the discharges of two-stroke engines.

Because the wells around the lake drew from the water table that was in intimate hydrologic contact with the lake, it is easy to see why so many wells had some MTBE.

In the recent NEIWPC survey of state experiences with MTBE issues, all but 10 states responding indicated that they had less than 40 private wells impacted. Collectively, the 10 states with more than 40 impacted wells estimated that about 2,300 private wells had been impacted. Maine observed that extrapolating its 1998 data to the entire state population of private wells would mean that between 37,000 and 50,000 wells would have MTBE at more than 0.1 µg/L

This survey of UST personnel can not be considered an accurate assessment of private well impacts but perhaps does give an indication that most states do not routinely characterize or track the impacts to private wells from UST releases, even though there may be many wells impacted.

In an article soon to be published in *ES&T* (Lince et al., 2001), the authors tried to determine if private wells are more likely to be impacted in areas where reformulated gasolines are used. The New York Department of Health conducted a survey of 71 private wells near 21 randomly selected gas stations. Forty wells were sampled in conventional gasoline areas, and 34 wells were sampled in RFG areas. Eight wells (20%) in the conventional gas areas and 13 wells (38%) in the RFG areas had MTBE at more than 1 µg/L. The authors note that given the small sample size of their study, "statistically definitive conclusions are limited," but they also note that their findings are generally consistent with the Maine and USGS studies that show lesser impacts to drinking water in non-RFG areas.

The USGS's National Water Quality Assessment program is preparing a summary report on about 1,700 private wells in 35 states that have been sampled over the last decade as part of its comprehensive evaluation of shallow groundwater quality. They will summarize data on the occurrence of

— continued on next page

Gasoline Oxygenates, cont.

55 VOCs in those wells. The results should be available by late fall (J. Zogorski, personal communication, 2001).

Who's Looking Out for the Private Wells?

Who speaks for the universe of households using private wells? The EPA Blue Ribbon Panel had a member representing public water suppliers, but no one really represented the concerns of private well owners. While the EPA Office of Ground Water and Drinking Water (OGWDW) has an extensive program to address community water systems, there is no federal authority for private wells. The OGWDW Web site has very little information on private wells or any related activities (<http://www.epa.gov/safewater/pwells1.html#more>).

The National Ground Water Association (<http://www.ngwa.org>) represents the drillers who install private wells and has established the National Well Owners Association (<http://www.wellowner.org/index.htm>). There is also a National Rural Water Association (<http://www.nrwa.org>).

As noted earlier, MTBE is just one of a long list of common contaminants in private wells. Perhaps the increased attention paid to MTBE will help raise awareness of all these threats. Absent a strong political voice, however, it may be awhile longer before there is resolution to this long simmering private well issue.

As *LUSTLine* was going to press, we learned that the New Jersey legislature has sent a bill to the Governor for signature that would require the private wells at dwellings being sold or leased to be tested for VOCs and other contaminants. The bill also provides funding for a public education program. This is clearly a step in the right direction.

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Editor's note: Reprinted with permission from LUSTLINE, Bull. 37, March 2001, a publication of the New England Interstate Water Pollution Control Commission (NEIWPCC), Lowell, MA.

A Discussion of MTBE & Minnesota's ground water appeared in the June 2000 MGWA Newsletter.

Students Learn Importance of Vital Resource

By the time you read this, some 1300 metropolitan area fifth grade students will have attended the Fourth Annual **Metro Children's Water Festival** on September 26th at the Minnesota State Fair Grounds. This fair was the largest Earth Day event in Minnesota this year.

Sponsored by the **Metropolitan Area Groundwater Alliance (MAGWA)**, and supported by contributions from the MGWA and the MGWA Foundation, the program is made possible by over 150 volunteers and presenters. They included staff from the seven Metro Counties, Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, Minnesota Department of Health, Minnesota Department of Agriculture, Metropolitan Council Environmental Services, several Soil and Water Conservation Districts, Minnesota Extension Services and the Board of Water and Soil Resources to name a few. Watch for a follow up article in the next issue.

— contributed by Joe Enfield,
Assistant Director, Carver County
Environmental Services

NGWA Holds Local Conference

The Second International Conference on Pharmaceuticals and Endocrine Disrupting Chemicals in Ground Water will be held in Minneapolis October 9 through 11, 2001. The Minnesota Department of Health and the United States Geological Survey are among the cosponsors.

Information and Registration are at www.ngwa.org or 1(800)551-7379.

MGWA helps celebrate Earth Day at Olson Middle School in Minneapolis

The Minnesota Ground Water Association participated in Earth Day Celebration at Olson Middle School in Minneapolis on April 19th. This fair is the largest Earth Day event in Minnesota this year and was declared the "Official State of Minnesota Earth Day Site" by Governor Jesse Ventura. Over 30 organizations representing government agencies, non-profit groups and various companies and corporations participated. Over 700 6th through 8th graders at the school attended the event. Other guests included the Minneapolis School Superintendent Carol Johnson, Minnesota State Representative Joe Mullery, and Minneapolis City Council Member Barb Johnson. The City of Minneapolis was represented by Bill Anderson of Environmental Services.

MGWA was there to provide "edutainment" about ground water. Under the MGWA banner, Mike Trojan of the PCA, Mike Schoenberg of Advanced Hydronumerics, and Chris Elvrum of the Metropolitan Council presented a multimedia display about ground water.

The DNR's 'ant farm' ground water model was used to show how ground water moves from high head to low head, the effects of pumping above and below a confining layer and how contamination moves through an aquifer. The attendees were shown how measurements of temperature, conductivity and pH are made in ground water and surface water samples with a YSI probe and data logger. Test strips were also used to show how nitrate concentrations are determined. In addition to these active displays, a poster of the water cycle and a newly purchased ground water adventure video were displayed. Half way through the event it was decided that there was too much going on for anyone to pay attention to the video, so it was shut off.

The real story of this event is not the 5 hours of constant mayhem, but the organizer, Everett Law. He originated this event three years ago and has

organized it since then. Everett is now in 10th grade at Henry High School. He is remarkably well organized and deserves all of the many praises he gets for this event. He is also very humble. The MGWA would like to thank Everett for inviting us to the event.

The MGWA would also like to thank the DNR for the use of the ground water flow model, water cycle poster and water use card handouts, and the PCA for the geochemical test equipment and 1,000 "freebie" PCA pencils. This event is one of the activities that MGWA's Ground Water Education Subcommittee is involved with to promote ground water education across the state.

Everett also said that the MGWA will be asked to participate in next year's Earth Day event at Olson Middle School. So lets think up some more activities that we can use to introduce Middle Schoolers to ground water studies.

— submitted by Chris Elvrum,
Metropolitan Council

Two MGWA Officer Positions Open for 2001

Call for Nominations: Secretary and President-Elect for the year 2002

Here's a chance for you or for someone you nominate to get in on the front lines of ground water resource protection in Minnesota.

The Secretary keeps the minutes of all MGWA Board meetings and is the custodian of the Association's official paperwork. He or she also assists with conference planning.

The President-Elect takes a leadership role in the planning of one of the Association's meetings while "learning the ropes" of MGWA leadership.

The Secretary serves a two-year term, and the President-Elect serves for a year before becoming President in 2003, followed by a year as Past-President.

Send nominations by October 15 to MGWA, 4779 126th St N, White Bear Lake MN 55110 or by email to office@mgwa.org.

MGWA Board Approves Ground Water Awards

The Minnesota Ground Water Association (MGWA), a professional association of approximately 500 members, has the following primary objectives:

- Promote and encourage scientific and public policy aspects of ground water as 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

The MGWA would like to recognize individuals who exemplify these objectives as well as provide exceptional service to the association in meeting these goals. The awards will be presented annually, and the nomination process is open to all.

The Board approved the creation of an awards committee to coordinate this process. Members interested in being involved in recognizing their peers by serving on the committee are requested to contact Leigh Harrod (leigh.harrod@metc.state.mn.us) or Sandeep Burman (sandeep.burman@pca.state.mn.us). Additional details on the awards and nomination forms will be included in the 2002 dues renewal mailing, and will also be available on the association web site. Nominations will be reviewed by the awards committee and recommendations presented to the MGWA board in early 2002. The first round of these awards will be announced in the March 2002 newsletter, and presented at the Spring 2002 conference. The process will subsequently continue on a similar annual cycle.

Corporate Membership Rates for 2002

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

Corporate Membership Features:

- Basic Level: Business Card ad in newsletter and membership directory, "Lobby Copy" of membership directory, web page sidebar, Certificate of Membership, and up to 4 employee memberships
- Standard Level: Quarter page ad in newsletter and directory, "Lobby Copy" of membership directory, web page sidebar, Certificate of Membership, and up to 9 employee memberships
- Industry Leader: Half page ad in newsletter and directory, "Lobby Copy" of membership directory, web page sidebar, Certificate of Membership, and up to 14 employee memberships
- Corporate Sponsor: Full sponsor acknowledgement in MGWA conference publications, full page ad in newsletter and directory, "Lobby Copy" of membership directory, Certificate of Membership, web page sidebar and up to 20 employee memberships

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

"Decorah Edge" Study Continues in Rochester

As described in the March issue of this newsletter, the aquifers above the Decorah Shale in the Rochester area recharge lower aquifers at the terminal edge of the Decorah confining unit. USGS studies suggest that half of the City of Rochester's water recharge occurs in this setting.

According to Terry Lee, Olmsted County Environmental Services, further studies of the ground water recharge processes in the Decorah Edge area are critical to making good land development and water management decisions. Studies are underway to test models of mass loading of water, loading of nitrate, and interflow residence time. The studies will also test the remotely-sensed soil wetness data collected the past several years and described in the March issue.

Work underway this summer includes testing models of recharge processes and water transfer in the edge area

and modeling of nitrate loading and uptake. GIS is being used to identify sites along the edge that are representative of differing landscape positions, land cover, ground water recharge conditions, and bedrock dip and strike. Data collected will include soil wetness, soil nitrogen, nitrate and chloride in water samples, and vegetative cover.

For more information, contact Terry Lee at (507)285-8339 or by e-mail at: lee.terry@co.olmsted.mn.us

On the Move?

Please take the time to inform MGWA of your new address and email.

Many companies can't take the time to forward your mail to you and if the company is still accepting your mail, MGWA will never know that you have moved on. Thanks!

Minutes of the Ground Water Education Committee

Date: August 1

Attendance: Cathy Villas-Horns, Chris Elvrum, Jim Lundy. Also, Tracy Fredin, Director, Hamline University Center for Global Environmental Education.

Tracy Fredin spoke with us about the possibilities for our two organizations to cooperate on projects of mutual interest. The Center for Global Environmental Education (CGEE) has four main interests:

- Graduate training for K-12 educators
- Project based learning (e.g., Friends of Frogs, Rivers of Life). Work with scientists, but don't actually do the science.
- Community based education. Teach the general public, partner with government agencies.
- Electronic story-telling. Videos, CD-ROMs, web pages, etc (e.g., Waters to the Sea).

Members of the committee demonstrated the sand-tank model to Tracy. He was quite impressed and suggested that there may be a way to enhance it as a teaching tool by producing a CD-ROM (about 30 minutes of interactivity) to go with it. The model could be demonstrated in class (hands-on), and the CD-ROM could be left with the class for viewing later (reinforce the hands-on).

We agreed to meet at least one more time to try to get this project going. We would like to involve some other organizations, including CGEE, MGWA, NGWA, AGWT, and, necessarily, a funding organization.

Tracy is also interested in arranging graduate credit through Hamline University for teachers who attend the Ground Water Trust's Teachers Institute in November.

Next Meeting: Wednesday September 12, 11:30-12:30, at the Metropolitan Council office in St. Paul.

Memo from LCMR

DATE: September 19, 2001
TO: Members, Minnesota Groundwater Association
FROM: Representative Dennis Ozment, Chair Legislative Commission on Minnesota Resources (LCMR)

SUBJECT: On behalf of LCMR I am seeking your input on the needs of our environment and natural resources.

Your experience and position in the natural resource field enables you to provide members of the legislature with unique knowledge to help guide our natural resource expenditures and investments in the State. The LCMR is embarking on its biennial cycle of site visits and discussions in order to revise the long-term plan for expenditures from the Environment and Natural Resources Trust Fund and the Minnesota Future Resources Fund.

I am seeking your help and perspective to inform the members of the Commission with ideas about new, innovative resource needs to help better manage our natural resources and to better enable the use and enjoyment by the community.

Your advice is requested about priorities for natural resource funding and recommendations on a process to be used by the Commission to help prioritize and determine those expenditures.

How can you respond to this request? We have several options. First, on the LCMR web site at: www.commissions.leg.state.mn.us/lcmr/lcmr.htm there is a survey of Priorities for funding listed and a space to speak to the priorities chosen. Or, second, respond by writing to the email address: lcmr@commissions.leg.state.mn.us or send your response by mail. To aid in the compiling of responses we request that you identify your issue area with a title similar to those listed on the web site survey. The issues listed include: Wildlife; Water Resources; Recreation; Land Use and Open Space; Forest Resources; Fish; Environmental Education; Energy; Agriculture; and Other (please specify).



DNR Waters invites you to view our Fall 2001 issue of its biannual newsletter, "Water Talk", now online at www.dnr.state.mn.us/waters

To view, select "Water Talk" under publications on the DNR Waters web site. **Water Talk will no longer be available in a printed format.**

The following are some of the select topics for the Fall issue available on the DNR Waters website October 2001:

- Spring 2001 Floods...Causes and Impacts
- Minnesota Climate Update!...Spring/Summer 2001
- Flooding: • *Mitigation* • *Comparative Floods*
 - *Flood Insurance Update* • *Extent of 2001 Flood Events*

Joe Oschwald, Editor of *Water Talk*
email address: joe.oschwald@dnr.state.mn.us

Meeting to hear public interests in a revision of the Health Risk Limits for Groundwater Rule

The Minnesota Department of Health (MDH) is laying the groundwork for a revision of the Health Risk Limits for Groundwater rule. A meeting will be held October 31, 2001, 2 pm to 5 pm, Red River Room, Minnesota Department of Health, Snelling Office Park, 1645 Energy Park Drive, St. Paul, Minnesota. The purpose of the October 31 meeting is to solicit comments and identify issues concerning the science and policy on which the Health Risk Limits are based.

If you would like to know more about the meeting, or are unable to attend but would like to be informed of other opportunities for public participation in the rule revision, please contact project manager Anne Kukowski (651/215-0854). The MDH will keep anyone participating in, or inquiring about, the meeting informed of future steps and progress in the revision of the rule.

For more information click on the "Groundwater and your health" *Quick Link* on www.health.state.mn.us.

MGWA Board Meeting Minutes

May 3, 2001

USGS WRD Offices, Mounds View, MN

Attending: Jim Lundy, Past-President; Jim Stark, President; Jan Falteisek, Secretary; Jeanette Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor; Jim Aiken, Advertising (by phone). Guests included Paula Berger and Gretchen Sabel.

Approval of Minutes – Jim Stark called the meeting to order at 7:45 a.m. The agenda was approved. Minutes for the regular Board meeting held March 1, 2001 were approved.

Corporate Membership – The membership committee presented a proposed structure for corporate

membership. Features and specifics were discussed in detail. The board approved conditionally (Jim L./Jan, m/s) the corporate membership program pending final editorial review of the specifications. The features/rate/form will be presented at the June Board meeting for final approval. The September newsletter will include an article about this new membership option.

Budget – General issues relating to the advocacy role of MGWA in relation to supporting the MPCA and USGS programs was discussed. It was noted that the MGWA Education Committee works on some, but not all MPCA objectives. Jim Lundy will present some of these issues at the next Education Committee meeting on June 26. Board members are to provide input on the mission of the MGWA by May 11.

Sponsorship Request – Jim Aiken noted a request from Mo-raine for use of the MGWA logo and access to the membership list to support their business. Jim A. was directed to contact Mo-raine and request a specific proposal. The Board declined to consider a long-term endorsement of their programs.

State Water Plan – Gretchen Sabel, Environmental Quality Board, discussed the status of state water planning efforts. Gretchen suggested some of these issues be included as part of the program for the fall conference.

MGWA Foundation – Paula Berger requested guidance from the Board on use of Foundation funds to create an endowment. Jennie Leete had proposed the Foundation invest part of the endowment in mortgage-backed bonds that she owns, paying 9.5%, to initially fund the endowment. Eric Hansen, Treasurer, will be requested to attend the next Foundation meeting on May 18 to assess the proposal.

Treasurer's Report – Sean Hunt distributed the financial report. The spring conference tentatively cleared about \$8,000 in profit.

Ground Water Education Committee – Jim Lundy discussed involving Parkview School, Roseville, in a project to monitor ground water in a wetland near the school.

Fall Conference – Tuesday, November 6 is the date for the fall conference. We have reserved the largest room at the Earle Brown Center.

Newsletter – Tom Clark noted the newsletter deadline is May 11. The September issue is planned as a 20-year retrospective.

Fall Field Trip – Tom Clark handed out the agenda for the fall field trip to the Brainerd area.

Meeting adjourned at 9:20 a.m.

June 7, 2001

USGS WRD Offices, Mounds View, MN

Attending: Jim Lundy, Past-President; Jim Stark, President; Rob Caho, President-Elect; Eric Hansen, Treasurer; Jan Falteisek, Secretary; Jeanette Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor.

Approval of Minutes – Jim Stark called the meeting to order at 7:00 a.m. The agenda was approved. Minutes for the regular Board meeting held May 3, 2001 were approved with corrections.

Treasurer's Report – An updated financial summary was presented. Based on projections, there may be \$5,000 in discretionary funds. A plan for the use of the discretionary funds will be considered at the July meeting. Also for consideration are expenses associated with 20th Anniversary activities. Eric Hansen will act as clearinghouse for ideas. Jim Stark said he would talk to George Garklavs about mug design.

Web Page – Sean Hunt said the on-line merchant provider would now be charging for the service. The Board approved six months of web merchant service at \$25 per month.

Conferences – The Board directed WRI to include a list of pre-registrants in conference packets.

MGWA Foundation – Jim L. reported that the Foundation is considering investment options for the endowment. He also noted there is a need for new Foundation Board members. To identify potential

candidates, each Board member is to make two contacts from the list of past MGWA officers.

Ground Water Education Committee – Jim L. reported that the committee is working on materials to be posted on the web site. He also handed out a draft MGWA mission statement for consideration at the July meeting and possibly at the Fall conference in a business meeting. The committee will meet later in June.

Children's Water Festival – The Board approved \$300 for the Children's Water Festival on September 26th.

Newsletter – Tom Clark noted the newsletter is in layout. This issue is the first that will be fully electronic.

Corporate Membership – Details for implementing corporate memberships were discussed.

Fall Field Trip – The fall field trip is being arranged in connection with the AIH conference. Rob Caho is the MGWA contact. The memorandum of agreement between AIPG and MGWA on responsibilities needs to be reviewed by the field trip committee. The AIH office needs to be kept informed of preparations and any changes. Jim Stark also noted that there will be other field trips as part of the AIH conference.

MGWA Awards – Jim Lundy will follow up on the proposed awards.

American Ground Water Trust – Jim Lundy reported that he had talked with Andrew Stone of AGWT regarding some activities they are planning this summer and fall. AGWT is asking MGWA to identify teachers that might be interested in attending those activities. Jim S. and Jim L. will talk with USGS WRD staff that know teachers that might be interested.

Science Museum – Jim Berg noted during a recent visit to the Science Museum that there were no displays on ground water. Jim S. said he could talk with a Science Museum contact.

Meeting adjourned at 9:00 a.m.

July 5, 2001

MPCA, St. Paul, MN

Attending: Jim Lundy, Past-President; Rob Caho, President-Elect; Jan Falteisek, Secretary; Jeanette Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor.

Approval of Minutes – Rob Caho called the meeting to order at 7:50 a.m. The agenda was approved. Minutes for the regular Board meeting held June 7, 2001 were approved with corrections.

Treasurer's Report – WRI provided a financial update.

Web Page – Sean Hunt said the set up for putting the newsletter on line is continuing. He will be adding the Fall Field Trip to the web site.

MGWA Foundation – Jim L. reported that the Foundation met June 29. The Foundation accepted \$300 from MGWA and added another \$100 for a total of \$400 for the Children's Water Festival. There was continued discussion on financial arrangements, investment of funds, and the relationship to MGWA. The Foundation Board also discussed the need to recruit new members for the MGWAF Board. An item is needed for the September newsletter. The Board indicated it would like to expand to five members. Rob Caho will call Bob Beltrami and Gordy Hess. Jim Stark will be Secretary and Dave Kill will be Treasurer. There is a need for a President and two others that will be anointed. Sean will provide a list of past officers with phone numbers.

Ground Water Education Committee – Jim L. reported that the committee met June 27. They refined and completed their mission statement. The committee is making connections with the American Ground Water Trust for their teacher institute. MGWA will assist identifying teachers to attend. The Board directed Jim L. and Andrew Stone work together to modify the assistance request from AGWT. MGWA will send a request for teacher identification. Cathy Villas-Horns is in contact with the AIPG education committee.

Newsletter – Tom Clark noted the newsletter would be delivered to the printer today. Tom has prepared an

historical review for the September issue. There is a newsletter meeting next Tuesday.

Corporate Membership – Final details for implementing corporate membership were discussed.

MGWA Awards – Leigh Harrod and Sandeep Burman have been working on an awards proposal. Four different (non-monetary) awards have been defined. The proposal dated June 15, 2001 is attached. A three-to five-person committee is proposed. They propose the committee be assembled at the fall conference and awards be given at the spring

conference. The Board approved the awards proposal as presented.

Fall Field Trip – Rob Caho noted he has a bus lined up that would bring attendees from Bloomington. He noted the itinerary needs to be finalized. WRI said the brochure needed to be ready by the beginning of August. Rob will call Brian Ross regarding preparation of the field guide.

Next meeting – The next Board meeting will be Thursday August 2, 2001, 7:30 a.m., at the U.S. Geological Survey office in Mounds View.

Meeting adjourned at 9:00 a.m.

PROGRAM HIGHLIGHTS AND REGISTRATION INFORMATION

46TH ANNUAL MIDWEST GROUND WATER CONFERENCE

October 22–24, 2001 ■ Inn on the Park Hotel ■ Madison, Wisconsin

You are invited to attend the 46th Annual Midwest Ground Water Conference in Madison, Wisconsin. This is an annual meeting held at the invitation of a participating state. The conference, which has been held each year since 1956, provides an opportunity for hydrogeologists, geologists, engineers, students and others studying groundwater resources to meet and exchange ideas, discuss mutual problems affecting the Midwest, and summarize the results of field and laboratory studies. The conference will include a half-day field trip to hydrogeologic highlights in the Madison area. Invited speakers will focus on the political and scientific implications of current groundwater issues, with a focus on Wisconsin. In addition, over 60 contributed papers and posters will address a wide range of current research regarding water resources in the Midwest. We are looking forward to an exciting meeting and hope to see you there. The complete program and registration materials are available electronically at the web site listed below.

PROGRAM HIGHLIGHTS AND SCHEDULE

Half-day field trip to local spring complexes and Shovler's Sink, which is an area of focused recharge. The field trip will depart from Inn on the Park Hotel at 1 pm on Monday afternoon, October 22, returning to the Hotel at about 5 pm. A Welcome Reception and Registration will be held from 7 to 9 pm that evening. The remainder of the Conference will begin at 8 am Thursday morning, October 23 and end at noon on Wednesday, October 24.

INVITED SPEAKERS

Kathleen Falk, Dane County Executive: "Groundwater and Public Policy: Swimming Upstream"

Jim Krohelski, U.S.G.S. and George Kraft, Central Wisconsin Groundwater Center, "Groundwater Quality and Quantity Issues in Wisconsin"

CONTRIBUTED SESSIONS

- Aquifer characterization and mapping
- Groundwater modeling
- Groundwater in the hydrologic cycle
- Groundwater quality
- Site assessment and remediation
- Inorganic contaminants
- Source water assessment program
- Biological contamination of groundwater
- Agricultural monitoring

The meeting will also include a poster session, an evening dinner and social, and Student Paper Award. For a complete program schedule and abstracts, please visit the web site of the Wisconsin Water Resources Institute: <http://www.wri.wisc.edu>. If you do not have access to the web, please contact Madeline Gotkowitz at (608) 262-1580 for a copy of the program.

LODGING AND MEALS

The conference will take place at the Inn on the Park Hotel, Capitol Square, Madison, Wisconsin. Please call the hotel directly at 800-279-8811 to make room reservations. Rates are \$79.00 (single) and \$89.00 (double). Government room rates are available; please indicate that you will be attending the conference and whether you qualify for the government room rate. Rooms are tax exempt with proper identification. A block of rooms has been reserved until September 28, 2001.

The conference registration fee will include lunch and dinner on October 23, and continental breakfasts on October 23 and 24.

The dinner will be held at Quivey's Grove Restaurant, a local tradition for festive gatherings. Transportation to the restaurant from the conference site will be provided.

REGISTRATION

General Registration

Before Oct. 15: \$90 ■ After Oct. 15: \$110

Student Registration

Before Oct. 15: \$45 ■ After Oct. 15: \$60

Optional field trip: \$15 (max. of 50 people)

Registration includes Tuesday breakfast, lunch and dinner; Wednesday breakfast; breaks both days; and program abstract book.

You may register on-line with a credit card by following links at <http://www.wri.wisc.edu>

OR, send registration form with check enclosed (payable to UW Extension)

Midwest Groundwater Conference
Attn: Sue Morehouse
The Pyle Center, Rm. 139
702 Langdon Street
Madison, WI 53706

OR, Fax form with credit card or purchase order information to (608) 265-3163

UW Extension will confirm your registration and provide a map and directions to the Inn on the Park Hotel.

For registration information contact:
Sue Morehouse at (608) 262-8892
or morehou@ecc.uwex.edu

Please note: A \$20 cancellation fee will be assessed to cancellations prior to Oct. 15th. After this date, no refunds will be given.

For Program information contact:
Ken Bradbury at (608) 263-7921
kbradbu@facstaff.wisc.edu

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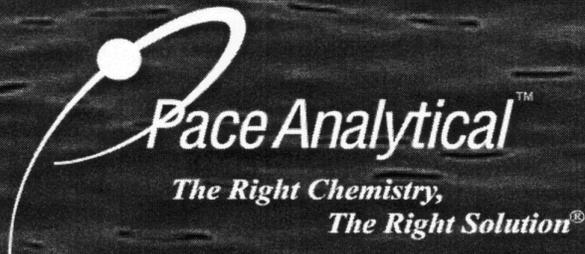
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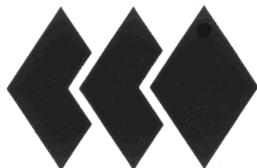


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Fall Field Trip, October 12-13, Brainerd Area
Fall Conference, November 6, The Value of Minnesota's Ground Waters

**LCMR Requesting funding priority input
by October 30 - see page 18 inside**