

Minnesota Ground Water Association

Volume 18, Number 2: June, 1999

President's Column

The MGWA Spring Conference was held April 30th. You will find a summary of the event in this issue. The objective of the conference was to give the new Ventura administration an opportunity to share with us their vision for water planning and policy during the next four years. I thank Jack Aldrich, Minnesota Planning, Keith Buttleman, Metropolitan Council, Ron Harnack, Board of Water & Soil Resources, Steve Morse, Department of Natural Resources, Gene Hugoson, Department of Agriculture, Gordy Wegwart, Pollution Control Agency, and Pat Bloomgren, Department of Health for speaking at the conference. Their participation made the conference possible.

I was personally interested in hearing about two issues that I have about state government. From my perspective of a local government employee, I have long considered bureaucratic notions such as "department," "division," and "agency" to be irrelevant because so much of state activity is centered around "programs." And it, unfortunately, seemed to me that each program was conducted as an entity, an island unto itself rather than as an important and integral part of the whole.

Although no solutions to this problem were presented at the conference, I was pleased to hear some of our new state agency leaders recognize the problem of "programization" and include it as one of the things they hope to change. The recently completed reorganization of MPCA with a geographical focus has the potential to end some of the isolation among existing programs. I have long believed that wellhead protection, if done right and I think that it is in Minnesota, will be a strong stimulus to greater cooperation among state and

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Arsenic and Drinking Water: Human Health Effects

The University of Minnesota Water Resource Center and University of Minnesota Extension Service sponsored a one-day conference on the human health effects of arsenic in drinking water April 14, 1999 at the Morris campus of the University.

About 60 attended the conference, which featured a speaker from the U.S. Environmental Protection Agency (EPA) and several speakers from the Department of Health's (MDH) Minnesota Arsenic Research Study (MARS). The conference was especially timely in light of recent MARS findings about the occurrence of naturally-occurring arsenic in west-central Minnesota ground water supplies, and the March 1999 release of the National Research Council's recommendations concerning revision of the current EPA maximum contaminant level (MCL) for arsenic in drinking water of 50 micrograms/liter. The consensus of the Council's Subcommittee on Arsenic in Drinking Water was that the current MCL for arsenic does not achieve EPA's goal for public health protection and, therefore, requires downward revision as promptly as possible.

After a welcome by **Mary Ann Scharf, Extension Educator for Stevens County**, the featured speaker for the conference, **Dr. Rebecca Calderon, Branch Chief for Epidemiology and Biomarkers of the Human Studies Division at EPA**, gave a current overview of the health effects of arsenic in drinking water. According to Dr. Calderon, arsenic is more abundant in nature than many realize, being the 15th most common element. She emphasized that it is important, however, to distinguish between organic forms of arsenic, that occur in food, from the toxic inorganic form. Arsenic has been

shown to be essential for some animals, but this is less certain for humans. Arsenic toxicity in humans is manifest in many forms, including various cancers and cardiovascular and neurological disease. The human body will methylate arsenic, making it more toxic, whereas most other animals will not.

EPA still intends to meet the mandate of the Safe Drinking Water Act amendments by proposing a new MCL for arsenic by January 2000 and promulgating the requirement by January 2001. EPA will sponsor a research workshop on arsenic for states later in 1999, and the Fourth International Arsenic Congress is scheduled for June 2000.

Following Dr. Calderon's overview, **Rich Soule, Hydrogeologist for MDH's MARS Project**, discussed their findings concerning the occurrence of arsenic in Minnesota ground water. Sampling of nearly 900 private water supply wells in west-central Minnesota has confirmed in considerable detail what several previous less intensive surveys have suggested, namely that there is a significant occurrence of wells with higher arsenic concentration than statewide averages associated with several

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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.

Arsenic in Ground Water, cont.

moraines deposited by glaciers which once covered this part of Minnesota. Rich's detailed work identified the Big Stone Moraine, which forms the divide between the Minnesota and Red River Valleys, as a primary source of arsenic to wells located in this area, occurring in an arc extending from Big Stone County on the south, then east and north to Becker County. Wells finished in the area of the moraine show mean arsenic concentrations of 14 micrograms/liter, and about 10 percent of the wells exceeded the current MCL of 50 micrograms/liter.

Next on the agenda, **Jean Small-Johnson, Epidemiologist for MDH's MARS Project**, gave an overview of the public health aspects of the study, including Phase II, which will involve testing of hair and urine of a subset of well owners whose water was tested for arsenic in Phase I. Jean summarized the results of Phase I by saying that of 869 wells tested in the study, 68 (7.8 %) had arsenic values above the MCL of 50 micrograms/liter, with a maximum value of 145 micrograms/liter.

In Phase II, 258 households were selected for the more detailed testing, representing a total of 380 people. The sample population was broken into three age groups: ages 6-17, 18-49, and over 50. In addition to collecting a second well sample for analysis, MDH asked selected members of the Phase II households to complete

a brief questionnaire and provide hair and urine samples to assess arsenic exposure. The questionnaires collected information about each participant's job, hobbies, diet, and general health to measure other potential sources of arsenic exposure. All individual data and personal identification collected as a part of the study is private and protected under Minnesota law.

The data from Phase II is currently being analyzed and evaluated and will be made available later this year. MDH is working with local media and physicians in the study area for any followup actions which may be necessary.

After a lunch break, **Ted Field, Director of Environmental Services for Bonestroo, Anderlik and Associates**, an environmental consulting firm, gave a case study in the removal of arsenic from a public ground water supply well in Hector, MN, in Renville County.

Hector had a problem with naturally-occurring arsenic in a city well, and examination of water quality and geology in the surrounding area showed that it would be less expensive to treat the existing well water to remove arsenic than to try to locate an alternate water supply for the city. Several treatment options were considered, including oxidation, filtration, ion-exchange, treatment with activated alumina, and reverse osmosis. The option selected included a combination of co-precipitation, followed by filtration. This option cost the city approximately \$800,000 to implement.

According to the Minneapolis Star-Tribune (April 5, 1999), the city of Buffalo Lake, another small community in Renville County with an arsenic problem, spent about \$750,000 to install a new treatment system.

Following Ted's talk, **Jeff Grugel, District Hydrologist for MDH inergus Falls**, briefly discussed treatment options for arsenic in private wells. The most common options, including distillation systems and reverse osmosis, can cost \$800-\$1200. Although expensive for the individual homeowner, these options are preferable to trying to deepen an existing well or drilling a new well, with no assurances that elevated arsenic won't

continue to be a problem in these wells.

The conference concluded with a panel of Dr. Calderon, Jean Small-Johnson, Jeff Grugel, and **Jodi DeJong, University of Minnesota Extension Service in Traverse County**. Jodi mentioned that the county tests 44 wells seasonally for arsenic, including some in the area of the Big Stone Moraine which MDH has found to contain naturally-elevated levels of arsenic. She indicated that the wells tend to fall in two groups, one with arsenic near the detection limit of 1 ug/l, and another with values exceeding 20 ug/l. This helps to confirm what MDH has found, particularly the tendency for arsenic levels to vary widely over short distances.

Dr. Pat Brezonik, Co-Director of the Water Resource Center and Professor, Department of Civil Engineering at the U of M, concluded the conference by thanking the participants. Attendees found the discussions interesting and educational, and left the conference knowing much more about the occurrence of arsenic in Minnesota ground water and an appreciation of how this information will add to the growing database of arsenic in water supplies worldwide, data which will be important to EPA as it seeks to establish a revised MCL for arsenic in the coming months.

—contributed by Tom Clark

**Support Your
Association
— Invite A
Colleague
to Join**

New PCA Information Referral Index

The PCA's Informational Referral Index (IRI) has been revised to reflect the new organization and is available on the PCA's web site at:

<http://www.pca.state.mn.us/about/whotocall.html>

Safe Yield and Sustainable Development

On March 4, 1999, Marios Sophocleous of the Kansas Geological Survey presented a thought-provoking summary of water management work in Kansas, "On the Elusive Concept of Safe Yield and Sustainable Development of Water Resources." Although Kansas, in contrast to Minnesota, is drier and functions under western water law, the problems described have counterparts in Minnesota. The lecture was part of the University of Minnesota, Department of Geology and Geophysics spring lecture series.

Dr. Sophocleous first reminded the audience that:

- 1) there is competition for readily available water,
- 2) water-related issues are contentious,
- 3) most of the developable water in western states is allocated.

He also brought to our attention that water management is intergenerational: the effects of management choices today may not be realized for tens to hundreds of years.

The hydrologic fundamentals underlying the concept of safe yield were next reviewed, in particular the audience was reminded that ground water exists in a state of dynamic equilibrium, affected by both surface and subsurface conditions. He noted that changes in natural replenishment will eventually affect aquifers, but he also stated that depletion of aquifers will also eventually affect surface waters.

After an initial period of ground water mining, continued ground water withdrawal will divert water from surface water sources. The time to reach the new equilibrium will depend on aquifer characteristics and distance to the source of induced recharge. This time can be relatively short, but it can also be long, so long that managers might forget or not realize the future impact. To illustrate this point, a pair of Kansas stream system maps was shown, one showing the stream system in 1961 and the other in 1994. A

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President's Column, cont.

local agency programs. Converting such ideas and goals into more effective and efficient state activities will require strong leadership from above. This leadership will require not only the "selling" of new ideas to staff or the redrawing of boxes and connecting lines on an organizational chart, but also evaluating performance and allocating resources according to how staff work, not only within the narrow confines of their individual programs but how those programs can work cooperatively with other programs.

The second thing that will be needed to make change for the better is strong followership. A concern that some members of the audience have, and that I share, is the potential inertia of the staff. Governors and commissioners come and go, and they bring and may take their ideas with them. But civil servants seem to last forever. This isn't necessarily a bad thing. A staff holds the knowledge borne of training and long experience that gives stability and continuity to our efforts to wisely use the resources of our state. But stability is dynamic; we should not mistake a stubborn refusal to change the way we do business for stability. And staff don't always have the best feel for the will of the people.

So those of us who were not named to leadership positions by Governor Ventura have a choice to make. Will we insist on doing things the old way or will we give new ideas a chance? Granted, a new idea isn't always the best idea or even an improvement over the status quo. But do we respond by killing it through benign neglect or deliberate sabotage, or do we work with leaders to improve ideas? And do the leaders foster and encourage an atmosphere where both leaders and staff recognize they are partners in service to the public?

I'll be long gone from this column before the verdict is in. But I have a sincere hope that every member of MGWA will be able to say that we worked together and improved the way we manage and conserve the ground water resources of Minnesota.

— Jim Piegat, MGWA President

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Safe Yield, cont.

conspicuous absence of perennial streams in western Kansas was noted in the 1994 map.

After laying the foundation, Dr. Sophocleous next addressed the concept of safe yield and its relation to water management policy. He noted first that safe yield is not related to the natural recharge rate. It has been defined this way, but at the expense of system discharge. The consequences of adopting a safe yield management approach in Kansas have been dried up or threatened surface waters, contamination in irrigated areas, saline intrusion, and regional ecosystems change. Recognition of these consequences has required Kansas to adopt new management styles that are adaptive, can function effectively in the face of change and complexity, and work within a complete ecosystem context. Impossible? Improbable? Not so, according to the Kansas experience. Easy? Certainly not. Dr. Sophocleous described several cases in Kansas that illustrated a variety of management decisions, including planned depletion, zero depletion, establishing minimum stream flows, and in one case, no further development.

As a final comment, Dr. Sophocleous noted that management of ecosystems is weak and needs to be improved.

Dr. Sophocleous has written a number of articles recently on the subject, including in *Ground Water* (v. 35, no. 4) and Kansas Geological Survey Public Information Circular 9 (with Robert Swain) and available at the Kansas Geological Survey's web site www.kgs.ukans.edu. He also edited the recently published Kansas Geological Survey Bulletin 239, *Perspectives on Sustainable Development of Water Resources in Kansas*.

For those interested, U.S. Geological Survey Circular 1139 is an excellent introduction to surface water and ground water interactions.

— contributed by Jan Falteisek,
Minnesota Department of Natural
Resources

Protecting Ground Water While Infiltrating Storm Water

By Louis Flynn, Minnesota Pollution Control Agency

Infiltration devices (infiltration basins and infiltration trenches) are controversial as a best management practice (BMP) for storm water management. Literature indicates that operation of infiltration devices is a concern for two reasons, failure to infiltrate and concerns for ground water contamination. Site circumstances dictate the magnitude of these concerns which must also be compared to the benefits of reducing storm water flows in surface waters and replenishing ground water through recharge. Infiltration devices should be used only after thorough, site-specific evaluation of all storm water management options. Infiltration should be used in conjunction with other measures, such as avoidance and pretreatment practices, in order to protect ground water quality and the function of the infiltration device. Sound judgment and good design, including a detailed site evaluation and proper construction techniques, should alleviate the operational problems with these systems. In Minnesota, at present, there has been no comprehensive research or documentation of successes or failures associated with storm water infiltration devices.

Restrictions

Class 5 wells — Under Federal laws, "Class 5 wells" which are essentially any storm water infiltration device that is deeper than it is wide, are required to be inventoried with the Environmental Protection Agency and the MPCA. There are no other regulations at the present time, but future regulation could be anticipated.

Minn. Rules, Chapter 7060 — Minnesota State laws (M.R.7060) prohibit the direct discharge of untreated storm water to the saturated zone if the discharge threatens ground water from potential pollutants. There could be liability if it is determined that a discharge has introduced contaminants into ground water in violation of state law. Treatment prior to infiltration is a suggested means to discourage the

potential introduction of pollutants into the ground water.

Wellhead Protection Plan — Local units of government must develop "Wellhead Protection Plans" in accordance with State laws and requirements. Special attention should be given to infiltration basins and trenches which may pose a high risk to the wellhead, especially for wells classified by the Minnesota Department of Health as vulnerable to contamination.

Goals

The goal for storm water runoff systems should be "To maintain after development, as nearly as possible, the predevelopment runoff conditions." This means that the pre- and post-development peak and total flows should be the same. It also means that the beneficial uses of ground and surface water should be unchanged before and after development.

We recommend that communities restrict peak and total flows to predevelopment levels or less. Peak control has often been done as part of the classic flood control requirements. The volume of runoff should be controlled so that pre- and post-development total flows are equal. For urban areas, the greatest volume of runoff over an average year comes from events under one inch in depth. Also, the increase in flow from urban development, as a percent of predevelopment flow, is greatest for the more frequent, smaller storm events. At a minimum the 2-, 10-, and 100-year events should be evaluated. The following are some of the reasons this is important:

Surface Flow Effects:

- **Pollutant Loads** — Pollutant loads are related more to total flow than to peak flows — thus, increased flow volume increases pollutant loading. For example, as the area of impervious surface within a lake's watershed increases, so does phosphorus loading to the lake. Additional phosphorus causes increases in algal growth which can deplete oxygen levels and can cause other impacts.

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Storm Water Infiltration, cont.

- **Wetland Habitat** — We are also concerned about changes in storm water discharges to wetlands. Wetland plant and animal communities are dependent on hydrologic conditions such as the frequency and duration of inundation. They can be very sensitive to hydrologic changes, especially the more frequent events. Wetland bounce (change in elevation from storm runoff events) criteria have been developed to provide suggested guidance in order to maintain the wetland vegetation in its current condition.
- **Erosive Stream Flows** — Flows that are reduced in peak but extended in length can be very erosive. We are especially concerned at the bankfull level, which is often about the 1.5 year recurrence frequency in natural systems. Urbanization causes dramatic increases in the frequency at which these flows occur or are exceeded. Ponds can reduce peaks, but without infiltration, ponds extend the duration of flow in developed areas.
- **Ground Water Recharge** — One of the more important considerations is that ground water recharge must continue to be sustained for the various functions that ground water provides.

Infiltration and the Potential for Ground Water Pollution

The potential for ground water pollution is a concern when planning an infiltration device. The effects of infiltration basins on ground water have been studied as part of the Nationwide Urban Runoff Program (NURP). The NURP study was conducted on infiltration basins in Fresno, CA and Long Island, NY. The soil beneath the basins was found to effectively trap the pollutants studied. There was no significant contamination of ground water from the basins.

Because the NURP studies concluded that there was minimal evidence of ground water contamination from the basins, the NURP final report did not recommend any change in the use of those practices (USEPA, 1983). This does not mean

that ground water cannot be adversely affected by infiltration basins. More recent studies conducted by Robert Pitt and others, (Pitt, 1994) discuss the risk of ground water contamination being a function of a compound's relative mobility, concentration, and solubility. Pitt suggests guidelines on using infiltration practices along with use of adequate pre-treatment devices to support infiltration practices.

Excluded Discharges

Discharges that should generally be excluded from infiltration devices include:

Construction Sites — Construction sites do not generally contain toxics with a threat to ground water, but high sediment levels will quickly clog infiltration facilities.

Spills — All reasonable measures should be taken to assure that spills do not enter infiltration areas. Pre-treatment ponds with skimmers and shut off measures are one method of dealing with spill potential.

Industrial Discharges — Untreated storm water from industrial and manufacturing areas has a high potential for elevated concentrations of metals and organic compounds. Industries under the storm water permit program are required, and other industries should be responsible enough to:

- Evaluate sources of potential contamination,
- Prevent storm water contact with contaminated areas and where prevention is not possible,
- Treat runoff from their sites.

Other Discharges — Other discharges should be investigated for exclusion. These include potentially illegal discharges such as dry weather sewer flows, which could be illegal industrial discharges or combined sewer flows. Heavily salted runoff from streets and parking areas should also be evaluated carefully for potential impacts, since infiltration does not treat high concentrations of chlorides.

Site Sensitivity Analysis

Before an infiltration system can be designed, a site sensitivity analysis should be performed. This evaluation may eliminate an infiltration practice

from consideration or determine appropriate ways to avoid potential effects on ground water. Because of varying geologic settings, a site evaluation needs to be tailored to the specific site conditions. A team approach to this evaluation is recommended where various disciplines such as engineering, hydrogeology, and soil science are represented.

Site evaluations should consider:

- **Runoff water quality** — If runoff water will contain significant soluble pollutants that could degrade ground water quality, such as from industrial sites or from heavily salted parking lots and roadways, a careful review of the pre-treatment systems is necessary to assure that the pollutants of concern do not simply pass through.
- **Uses of the ground water** — Is the ground water a sole source aquifer, in a wellhead protection area, or a significant natural resource? Do current or likely future drinking water supply wells tap the receiving aquifer?
- **Geologic (ground water) sensitivity** — A site with a highly sensitive geology such as those with carbonate or karst features may eliminate these areas from consideration.
- **Depth to water table** — The water table must be far enough below the bottom of the structure to allow the structure to function.
- **Soil permeability** — Soil permeability must be great enough to drain the system in a reasonable amount of time, generally 72 hours or less.
- **Soil characteristics** — Evaluate the soil's ability to trap or treat pollutants expected at the given site and also provide the required infiltration rate.

These are a few of the major considerations involved in site sensitivity analysis.

Objectives

Our objectives should be to:

- Avoid Impacts
- Minimize Impacts
- Mitigate Impacts

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Storm Water Infiltration, cont.

Measures to be Taken

Avoidance —

Avoid sensitive areas, which may mean careful zoning or exclusions for development in highly sensitive geology, or wellhead protection areas.

Minimization —

Reduced impervious surface: Development policies which reduce impervious surface area should be the first BMP for controlling the pre- and post-development hydraulic conditions. Measures such as cluster development should be considered to reduce the volume of runoff. After the increase in runoff has been minimized, infiltration should then be considered to reduce the volume of runoff to pre-development rates.

Pollution prevention, and education should be a top priority for consideration in order to avoid pollution problems related to infiltration.

Bypass: After consideration of flow, concentration, and the nature of the aquifer, materials that are highly soluble and can impact ground water may need to be kept from being discharged to the infiltration system. The ability to bypass contaminated flows past the infiltration devices may be an important part of the system design.

Pretreatment — Dissolved materials, settleable solids, floating materials, and grease/oil should be removed from runoff to the maximum extent feasible before it enters the infiltration basin. If these materials enter the basin, they can pass through to ground water, or clog the bottom of the basin, take up storage volume, and cause the system to fail. Devices such as detention ponds with skimmers, vegetative filters, sand filters, peat sand filters, grassed swales, biofilters, bioretention, filter strips, or oil/grit separators can be used to remove these materials before they enter the infiltration basin. It may be feasible to allow limited amounts of these materials to enter the basin if their effects are considered during the design. One method of planning for this is to rely upon infiltration out of the sides of the basin, or in extended detention areas of the system, instead of the bottom.

Water table and bedrock separation

We recommend a minimum 3 foot distance be provided below the bottom of the system and bedrock (10 feet to fractured bedrock) or the water table.

Mitigation —

A mitigation plan should be developed or all reasonably anticipated contingencies. This could involve ground water monitoring, and policies of preparedness for ground water cleanup.

Design, Installation and Maintenance

System Design —

Off-Line Systems: Infiltration basins can be constructed as "off line" systems where the low flows are directed from treatment ponds to infiltration devices. High flows would continue to be routed through the treatment ponds but the majority of high flow could be discharged downstream so as not to overload the infiltration systems.

Off-Line (Off-Channel) Storage: The hydrologic design of infiltration basins should be done by professionals in accordance with accepted and appropriate procedures. Flood routing is recommended for all infiltration devices, and a system of bypasses or overflow should be considered.

Installation —

Proper installation and maintenance of infiltration devices and their pretreatment measures is critical. Soils in the infiltration area should not be disturbed, or the infiltration capacity may need to be restored after construction.

Maintenance —

Infiltration devices and pretreatment measures should be maintained with a regular inspection schedule and a regular maintenance schedule. Sediment accumulation is greatest with the most efficient of infiltration devices. Therefore, it is

most important to regularly inspect and maintain these systems to maximize their efficiency and longevity. Sediment removal within the basin should be performed when the sediment is dry. This prevents smearing of the basin floor and allows sediment to more readily separate from the basin floor.

Vegetation should be maintained as needed. Basins with healthy vegetation tend not to clog. The use of low maintenance, flood and drought resistant plants will minimize maintenance needs. Native vegetation may be an important option for some sites. Consider using professionals familiar with plantings used specifically for these design methods.

Summary

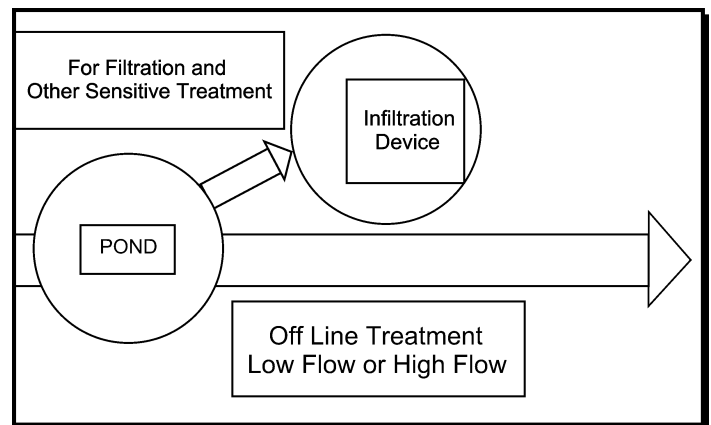
When used appropriately, after careful site specific considerations, infiltration can be an important part of a storm water system.

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Storm Water Management for Today and Tomorrow, Program Packet prepared for the March 8, 1999 conference held at Earle Brown Center, University of Minnesota, St. Paul Campus



Schematic including Off-Line Treatment

In Situ and On-Site Bioremediation Conference

The Fifth International Symposium on In Situ and On-Site Bioremediation convened April 19-22, 1999 in San Diego. Several representatives of government, industry and consulting in Minnesota were among the 1500 attendees. The keynote speaker, consumer and environmental advocate Ralph Nader, pointed out the need for regulators to help companies "internalize the externalities" (set rules of business so that environmental damage becomes a cost of doing business) so that the "blasphemous becomes routine" (when the battles are done, corporations finally accept the controls placed by government). He challenged corporate staff to crusade new ways of safely doing business by becoming "epicenters for agitation". He also made a plea for simpler language in science—for example, what's wrong with "biotreatment" instead of the clumsy "bioremediation"? (he then suggested that "biotreatment" may sound too much like psychology).

Technical sessions covered a range of issues, including the following highlights:

- **Air sparging.** The session chair noted the 1995 conference featured arguments about whether air sparging really works; current discussion conceded that it works, and focused on design optimization. Several talks described radius of influence estimation and measurement of oxygen mass transfer during biosparging. Some authors assessed sparge performance optimization through pulsed operation. One presentation introduced a default sparge design.
- **Bioaugmentation.** A paper titled *Full-Scale Remediation of Carbon Tetrachloride Using Bioaugmentation* combined the use of native and non-native microorganisms, injected with nutrients and recirculated ground water to degrade carbon tetrachloride.
- **Phytoremediation.** A paper titled *Phytoremediation of the Fully Chlorinated Compounds Carbon*

Tetrachloride and Perchloroethylene demonstrated complete mineralization of carbon tetrachloride. Others suggested that some plants (e.g., hybrid poplars), could be used in Minnesota to treat high nitrate waters entering the major rivers in agricultural areas.

- **Anaerobic and aerobic degradation of chlorinated solvents.** The papers in this session were evenly divided between laboratory studies and actual fieldwork.
- **Natural Attenuation.** "Wink and Walk" was an interesting phrase describing what natural attenuation is not supposed to be. Several papers evaluated whether natural attenuation was a valid remedial action at specific sites. Some referred to natural attenuation as a treatment technology, but one might wonder how monitoring what is going on naturally could be defined as a treatment.

Consumer Confidence Reports about Drinking Water

New "consumer confidence reports" are expected to deliver good news about state's drinking water. Beginning later this year, customers of Minnesota's community water supply systems will start getting regular reports on the quality of their drinking water — and based on statewide test results just released by the Minnesota Department of Health (MDH), the news should be good.

The annual MDH drinking water report for 1998 — which summarizes the results of routine monitoring tests for the state's 958 community water supply systems — has revealed little evidence of contamination problems in the state's drinking water.

This year, for the first time, detailed results of those test results will also be provided directly to consumers, in the form of a federally-mandated "consumer confidence" report.

The new reports, which are required under 1996 amendments to the federal Safe Drinking Water Act, notify

Consumer Confidence Reports, cont.

consumers about any contaminants that may have been detected in their drinking water during the preceding year. If any of the contaminants have exceeded any applicable drinking water standards, the reports will also include information about potential health effects.

Systems serving more than 10,000 people will mail the reports to their customers, and systems serving between 500 and 10,000 people can simply release the required information to their local media. Smaller systems must simply notify their customers that the information is available.

Water supply systems must provide the reports once a year. Most consumers should expect to see a report for their water supply system between now and the end of summer.

The reports offer a reassuring picture of drinking water quality in the state. Test results rarely revealed detectable levels of contamination — and violations of applicable state or federal drinking water standards were rarer still. Whenever problems were discovered, action was quickly taken to prevent any potential health problems.

The new MDH report covers test results for all community water supply systems — that is, systems that provide water to people in their homes. These community systems include all 708 of the state's municipal water systems, as well as 250 systems that provide water in settings like manufactured home parks, apartment buildings, housing subdivisions, colleges, hospitals and correctional facilities.

The findings of this year's report include the following:

- During 1998, MDH conducted 26,784 separate tests for up to 118 different pesticides and industrial contaminants. None of the state's community water supply systems exceeded applicable health standards for any of these contaminants.
- Thirty community systems tested positive for bacterial contamination. That included 19 municipal

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Consumer Confidence Reports, cont.

systems, mostly serving smaller communities in greater Minnesota. Residents of the affected communities were advised to boil their water before using it for drinking or cooking, until these systems could be disinfected and retested.

- None of Minnesota's community systems exceeded current standards for a list of 13 inorganic chemicals. Many of these chemicals occur naturally in Minnesota's ground water.
- Two municipal systems exceeded the federal standard for nitrate or nitrite which is primarily a concern for infants. The oxygen-carrying capacity of the blood of infants is reduced, resulting in a serious condition known as methemoglobinemia — or "blue baby syndrome." Residents of these communities are warned not to let infants consume the water until steps can be taken to correct the situation.

Well Owner's Handbook

The Minnesota Department of Health (MDH) has published the *Well Owner's Handbook - A Consumer's Guide to Water Wells*. It is a 30-page manual that provides useful information about ground water, how a well is constructed, and how a water system works. The handbook contains information about well water contaminants, what can be done to keep the well water safe to drink, troubleshooting problems with a well, and how to have a well properly sealed.

A free copy of the handbook is available from the Minnesota Department of Health, Well Management Section, P.O. Box 64975, St. Paul, MN 55164-0975, (651)215-0811 or toll-free 1-800-383-9808. Multiple copies are available through the Minnesota's Bookstore at a cost of \$3.95 per copy plus tax and shipping. The stock number is 10-14. To order from the Minnesota's Bookstore call (651)207-3000 or toll-free at 1-800-657-3706.

Children's Water Festival Held in Mankato

Another Children's Water Festival took place on March 16, 1999, this one coordinated by the Brown-Nicollet-Cottonwood Water Quality Board. Like a similar event held at Fort Snelling in October 1998, the Children's Water Festival featured a day of water-related hands-on education for 4th graders from the three-county area. Close to a thousand students participated!

Water festivals are used more and more as a means of educating children about ground water: How ground water moves; where it goes after we use it; how to protect ground water sources, etc. Education is often most effective when "book learning" is accompanied by experiential, or hands-on, learning.

During the festival the children traveled to learning stations, where the five senses were often employed in activities like:

- Gustavus Adolphus College Geography Department's *Fur Trading on the River*
- *Down and Dirty with Soil and Water*, by Sibley County Water Planning;
- *Leaky Landfills*, by the Minnesota Rural Water Association;
- "River" singers Scott Sparlin and Eddie Allen, and
- James Gerholt's *Amphibian* presentation.

The festival enjoyed the financial and in-kind support of diverse sponsors, including:

- U.S. Environmental Protection Agency;

- Minnesota River Basin Joint Powers Board;
- Brown County Water Planning;
- Cottonwood County Water Planning;
- Nicollet County Water Planning;
- Minnesota Corn Growers Association, and the
- Minnesota Department of Health, to name just a few.

In evaluations following the festival, many teachers wrote glowing assessments of the day's organization and of the presenters' ability to engage the 4th graders. The festival would not have been possible without the approximately 100 volunteers who served as classroom guides, photographers, and water drops.

— contributed by Judy Meath



— Robin Buhmann of the Minnesota Rural Water Association makes a point to interested students at the Children's Water Festival

Spring Conference Looks to the Future

On the morning of April 30, 1999 about 70 attendees gathered at the Minnesota History Center to get a sense of the future for ground water as envisioned by state agency representatives.

MGWA President James Piegat welcomed the speakers and attendees. During the course of the morning several speakers noted that the changes to date in the Ventura Administration were still too fresh to get a clear picture of the future. And unfortunately, not all new agency heads attended, sending in their stead staff who had experienced multiple administrations. In addition, several speakers could not attend the entire morning due to ongoing budget discussions and other commitments as the Legislature entered the final two weeks of the session.

Jack Aldrich, Deputy Director, Minnesota Planning, started the morning's program by noting that water issues are complex. He noted that Minnesota Planning staffs the Environmental Quality Board and that a new 10-year state water plan is in process. He introduced briefly the concept of the Governor's Water Management Unification Initiative. The Initiative is intended to provide a process and structure for water related efforts by agencies.

Keith Buttleman, Environmental Programs Director, Metropolitan Council, focused his comments on ground water availability, noting that ground water is not an infinite resource. He noted that although Minneapolis and St. Paul are supplied mostly by surface water, new growth in the Twin Cities area is into areas of constrained ground water availability. Competing uses and water quality issues limit availability in local areas, and so responses such as sharing water between systems and more emphasis on wise use might be needed. In response to a question, Mr. Buttleman noted that the Council has many new members and that there is currently a high interest in transit.

Ron Harnack, Director of the Board of Water and Soil Re-

sources, began by noting that that BWSR has responsibilities in water resources protection, training, and state coordination. He noted that in the future he expects to see an increase in decentralization, shared technical capability, continued fiscal constraint, and continued development of watershed management. In addition, he would like to see local water planning providing the framework for water management, better coordination between counties and cities, and better defined outcomes for water management efforts.

Steve Morse, Deputy Director, Department of Natural Resources, said that in Minnesota, "we are awash in a scarce resource — water". And there is a need to be concerned about long term sustainability of clean useable water. Recently appointed to the DNR, he had not noted a lot of turnover in practical management and didn't expect to see radical shifts in the framework. He noted the need particularly for better coordination, education, and transmittal of information to the local level. From his experience as a state senator he noted the need for education of legislators, who are generalists, and the public.

Eugene Hugoson, Commissioner, Department of Agriculture, noted at the beginning the connection between agriculture and water. His remarks conveyed his concern for the current and future farmers of Minnesota. He noted particularly two agribusinesses which cause impacts on the water resource: cropping and livestock operations. Past practices of pesticide use often resulted in overapplication, but he noted that current practices are much more tightly controlled. With regard to livestock operations, he noted that the General Environmental Impact Statement (GEIS) for feedlots was being prepared and would ideally lead to a structured decision-making process on a sound scientific basis.

Gordy Wegwart, Assistant Commissioner, Pollution Control Agency, addressed several topics, including the recent reorganization of the agency and the need for creative ways to solve problems. He said that the shift from media-based organization to geographic-based or-

ganization should result in more local communication. He noted in regard to ground water protection, that remediation approaches have changed; no longer is "dig and pump" the automatic choice. In some cases natural attenuation has seemed to work. However, there is a need to keep looking for new ideas. He stated that the Pollution Control Agency is open to at least considering new technologies.

Pat Bloomgren, Director, Environmental Health Division, Department of Health, noted from the perspective of 25 years in state agencies that coordination and communication has improved. She noted, however, that agencies tend to be formed in response to a given problem or constellation of problems, resulting in fragmentation. She said that in Minnesota people "tend to think water has no value unless there's a drought.". Looking to the future, she said coordination and sustainability were two issues of concern. She implied sustainability policy won't be taken seriously until development proposals are denied due to resource concerns. Currently, the MDH is evaluating the potential for microbiological contamination of water supplies. Preliminary results indicate little potential. On the other hand, elevated arsenic is a concern in a number of water supplies, as is radon.

The morning's program closed with a panel discussion and questions from the audience. The questions focused on fine-tuning the current agencies and responsibilities. Tools and approaches to accomplish better resource management and protection included refocusing on goals rather than programs, cross-agency communication, and local demonstration projects.

— contributed by Jan Falteisek

WWW.MGWA.ORG

Use of Ground-Water Models

The following is the abstract of the Langbein Lecture presented at the AGU Spring Meeting by Dr. John Bredehoeft

Ground-water models, like all models, are an abstraction of reality. By their very nature they require assumptions about the real system. In most cases, especially those dealing with transport, parameters are not independently measured. Rather, a number of parameters are derived from a best model-fit to observations.

While optimization can derive a best fit to parameters, one cannot argue for a unique solution. In an earlier paper, Konikow and I argued that models cannot be "validated." Konikow's work, using post-audits, showed that in most cases the models did not do well in predicting the future state of ground-water system.

Ground-water models are used widely for several purposes:

1. to extrapolate system behavior backwards in time often with the intent of determining responsibility, especially in cases of water quality degradation of contamination;
2. to predict the long-term behavior of a system to various stresses;
3. to better understand the working of ground-water systems, and design monitoring;
4. to explore the behavior of the system to various changes in administrative policy.

As computers have become more powerful, ground-water models have become more complex. The models have been used increasingly in litigation where much of the modeling has been to explore backwards in time in an effort to assess responsibility for some adverse impact to the ground-water system. Often these models have become part of a court battle. The models are attacked on the basis of their abstraction. In responding to these attacks, ground-water models have become increasingly more detailed, and expensive. However, knowledgeable lawyers comment: "Most, if not all, models can be de-

stroyed in court." Ground-water models are most useful:

- 1) in helping to better understand ground-water systems and how they work, and
- 2) in exploring policy to administer ground-water systems.

Models to address these issues do not usually require large and complex models — often simpler is better.

Dr. John Bredehoeft
1154 St. Paul Street
Denver, CO 80206
jdbrede@aol.com

2000-2001 Fulbright Awards for U.S. Faculty and Professionals

Opportunities for lecturing or advanced research in nearly 130 countries are available to college and university faculty and professionals outside of academia. U. S. citizenship and the Ph.D. or comparable professional qualifications are required. For lecturing awards, university or college teaching experience is expected. Foreign language skills are needed in some countries, but most lecturing assignments are in English.

Deadlines:

August 1, 1999: for lecturing and research grants in academic year 2000-2001

November 1, 1999: for international education and academic administrator seminars

January 1, 2000: for NATO advanced research fellowships and institutional grants

For information:

USIA Fulbright Scholar Program
Council for International Exchange of Scholars
3007 Tilden Street, NW,
Suite 5L, Box GNEWS,
Washington, D.C. 20008-3009.
(202)686-7877
Web: www.cies.org
E-mail: apprequest@cies.iie.org (requests for application materials only)

Retreat Scholarships

Riverwood Inn and Conference Center is pleased to announce the formation of the Riverwood Foundation.

This Foundation will provide up to 6 expenses-paid retreats per year for individuals needing 3 to 5 days away from their daily routine in which to write that piece of poetry, article, thesis, curriculum, or business plan; start or get back to that book or screenplay; create the perfect painting or photograph; take time away for spiritual contemplation or just escape from life's daily stresses.

To be considered, applicants should submit an essay of not more than 500 words including: the details of their project or need, why the individual needs time away to accomplish this work, how a stay in Riverwood's environment would help them accomplish this goal, and a statement of how their current financial situation may make it difficult for them to do such a retreat on their own.

Applications should be submitted to:

Pitzrick and Associates, Inc.
9322 Overlook Trail
Eden Prairie, MN 55347-2931

ASFE Releases New Directory

Firms that provide geoprofessional, environmental, and civil engineering services, including brownfield services, are listed in a new directory now available from ASFE. The directory identifies the organization's 300 member firms and provides state-by-state listings of their 1,000-plus offices. Each office listing identifies the name of the firm, its postal and e-mail addresses, as well as telephone and facsimile numbers.

The directory also lists ASFE's individual members, as well as committees and their personnel, the board of directors, and staff.

The new ASFE directory is available at \$5 per copy prepaid from ASFE, Professional Firms Practicing in the Geosciences, 8811 Colesville Road, Suite G106, Silver Spring MD 20910; phone (301)565-2733; fax (301)589-2017; or e-mail: info@asfe.org.

1999 Darcy Lecturer, Scott Tyler

On April 8, 1999, Dr. Scott W. Tyler (Desert Research Institute and Univ. of Nevada/Reno) presented his lecture entitled "Ground-Water Recharge in Arid Regions: Questions about Today and the Past", the 1999 Darcy Lecture. As context for this topic he talked about the reasons to study recharge in arid environments: First, understanding the magnitude of recharge and controls affecting that rate will help us be good stewards of ground water resources. Second, arid environments are often sought out as waste disposal sites, thus understanding recharge mechanisms in such areas is important. Lastly, deep vadose zones and slow flow rates present in many arid environments may preserve aspects of past climate and paleohydrology.

The primary field site where Dr. Tyler conducted the research described in the talk was at the Nevada Test Site. Two areas in particular were instrumented: Frenchman Flat (water table at 240 m; precip of 124 mm/yr) and Yucca Flat (water table = 450 m and precip of 160 mm/yr).

The principal tools used for his study included simple and complex soil physics calculations, temperature profiling, and environmental tracers. Each technique was used independently and the results compared. Dr. Tyler found similar results with each method. These results indicate that deep soil water in the vadose zone may be as much as 120,000 years old, and that deep infiltration does not readily occur in these environments in today's climate. His observations also suggest that during periods at or near the glacial maximum, recharge rates of 1 to 3 cm/year were possible. Dr. Tyler described vadose zones in arid regions as "low-pass filters" that only respond to persistent patterns over significant periods of time which makes them excellent archives of past climate.

Dr. Tyler concluded his presentation by observing that the role of plant communities in controlling water balance in the vadose zone is very important, especially in arid environments like southern Nevada, where

small changes in the water budget can have dramatic effects. Uptake by plants diminishes the amount of infiltrated water available for recharge, and the absence of plants will likely disturb that balance, with perhaps undesirable effects. To drive that point home, he showed oblique aerial photos of a waste-disposal site in southern Nevada where the area around the site was sparsely vegetated but the waste disposal areas were free of vegetation. He argued recharge occurs in most arid environments without plant communities, and that in areas with plants, the process is much diminished.

Closed depressions caused by underground nuclear testing are a unique feature of Dr. Tyler's study area. He singled them out as very likely to act as focused recharge features. While in Minnesota we, fortunately, don't have to worry about the effects of underground nuclear testing, we do have many poorly developed surface water drainage systems due to Pleistocene glaciation. Within these environments it is quite common to have small, closed depressions that have no outlet except for recharge to ground water and evaporation. The exact role of closed depressions serving to focus recharge was not the topic of his talk, but it is something we in Minnesota often need to consider.

For more on Dr. Tyler's research, consult Tyler et. al., 1996, *Water Resources Research*, v. 32(6): 1481-1499, where some of the site data and research results are presented in more detail.

SDWA: What's on the Horizon?

August 6, 1999

- Report to Congress on State ground water programs
- Propose a radon standard
- Issue a list of no more than 30 contaminants to be monitored by Public Water Supply Systems (PWSS) and to be included in a national occurrence database
- Promulgate final regulation establishing criteria for a monitoring program for unregulated contaminant

- Establish National Contaminant Occurrence Database
- Final Public Notification regulation

October, 1999

- Final determination on whether States are implementing new system capacity (DWSRF)

January 1, 2000

- Propose new standard for arsenic

August, 2000

- Promulgate a regulation for filter backwash recycling within the treatment process of a PWSS
- Promulgate with final radon standard and alternative MCL and publish guidelines for multimedia mitigation measures

November, 2000

- Promulgate Final Enhanced Surface Water Treatment Rule

January 1, 2001

- Promulgate final standard for arsenic

— excerpted from *MN Rural Water Association newsletter*

VOC Fact Sheet Available

A one-page (two-sided) fact sheet, Volatile Organic Compounds (VOCs) in Minnesota's Ground Water, is now available from the MPCA. The fact sheet discusses sources and types of VOCs in ground water, Health Risk Limits (HRLs) for VOCs, how VOCs are distributed in ground water in Minnesota, and some management strategies for reducing ground water risks from VOCs. The fact sheet is the fourth in a series of chemical fact sheets prepared by the Environmental Outcomes Division using GWMAP statewide baseline network data from 954 wells statewide. The VOC fact sheet complements previous sheets on nitrates, boron and arsenic. Copies of fact sheets may be obtained by contacting Tom Clark in at the Minnesota Pollution Control Agency:

Thomas P. Clark, PG
MPCA Environmental Outcomes Div.
520 Lafayette Road
St. Paul, MN 55155-4094
Phone: 651-296-8580
Fax: 651-297-7709
E-mail: tom.p.clark@pca.state.mn.us

Professional Geologist Licensure Update

The Board of AELSLAGID, responsible for geologist and soil scientist licensure in Minnesota has had an eventful spring. George Iwan retired last winter and was replaced as executive secretary by Doreen Frost. In addition, the term of Mike Convery as the geologist representative on the board expired in January. Gov. Jesse Ventura appointed Mike Kunz as the new geologist representative.

The Board of AELSLAGID sought statutory changes in the 1999 legislation and Governor Ventura signed the conference committee legislation (effective August 1, 1999) that would require three substantial changes:

1. The biennial license fee will go to \$120 for the professional license from the current \$70.
2. Continuing education is now a requirement - 24 personal development hours per biennium for all professions. The 24 hours will have to be accrued by July 1, 2002. The Board will likely "get the word out" during the next year and with the July 1, 2000 renewals on the details of continuing education.
3. The Board will now collect exam administration fees.
4. The penalty ceiling is raised from \$2,000 to \$10,000.

MGWA Board Meeting Minutes

February 4, 1999

Location and Time — Egg & I, University and 280, St. Paul, MN, 7:30 a.m.

Attending — Paula Berger, Past-President; Jim Piegat, President; Jim Lundy, President-Elect; Jan Falteisek, Secretary; Lee Trotta, Treasurer; Paul Bulger, Past-Treasurer; Jeanette Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor; Leigh Harrod, Advertising Coordinator.

Approval of Minutes — Jim Piegat called the meeting to order at 7:40 am. Minutes for the regular Board meeting held January 7, 1998 were approved as corrected.

Coming in October

44th Annual
**Midwest
Ground Water
Conference**

October 13-15, 1999 St. Paul, Minnesota



Field Trip will highlight the landscape history and the ground water issues of the Twin Cities

Plenary Session speakers will focus on issues of both national and regional concern

Topical Sessions will cover a broad range, from modeling to karst

Monitoring Workshop provides a forum for exchange of experiences

Poster Session welcomes browsers

Host Agency
Minnesota Department of Natural Resources

Conference information: www.dnr.state.mn.us/waters

The Minnesota Ground Water Association is proud to sponsor student participation in the Midwest Ground Water Conference

Agenda — Geoscientist mailing list was added to the agenda.

1999 Officer Elections — Jim Lundy, President-Elect, and Lee Trotta, Treasurer, were welcomed to the Board. Jim Piegat will send Jim Lundy a list of email addresses of other Board members.

Midwest Ground Water Conference — In response to an inquiry from Andrew Nichols, AIPG, it was concluded that a coordinated field trip with the October MGWC would probably not work; mid-September has been typical time. Jim Lundy will contact Andrew regarding schedule.

Birdsall-Driess Lecture — MGWA will contribute \$50 towards refreshments.

Spring Conference — Jennie provided estimated costs for holding the half-day spring conference at the 3M auditorium on April 30th. A variety of potential topics were discussed. Because of changes in state government and agencies, the topic "New Leadership in Evolving Ground Water Policy" will be developed further. Jim Piegat will send a formal request to the governor's office and heads of agencies with ground water roles.

Scholarships — The Board approved \$300 for Carleton College to

support a karst field trip. The Board also approved \$300 to support the University of Minnesota Hydrogeology Field Camp. Jennie distributed the 1998 statement of public service activity. Jim Piegat suggested reserving one scholarship typically awarded to support student participation in the fall field trip.

Membership — Leigh Harrod reported the geoscientist licensing board is providing a list of licensed geoscientists and soil scientists. The MGWA will exchange newsletters with the Board.

Web Page — It was noted that the web page needs updating, including new officers, newsletters, membership form, and request for ideas for conferences and field trips.

Financial Summary — Paul Bulger distributed the 1998 financial summary. Net profit for the year was \$1,630.79. Summary charts will be included in the March newsletter.

Next meeting — The next Board meeting will be Thursday March 4th, 1999, 7:30 a.m. at Egg & I.

Meeting adjourned 9:00 am.

— continued on page 12

MGWA Calendar

Contact information for the major event-holders is listed at the end of the column. If you become aware of a relevant event which may not be widely publicized, please send the information to the attention of the editor. Thank you.

June 14-16, 1999 Principles of ground water – flow, transport and remediation, Portland, OR. NGWA.

June 17-18, 1999 Assessment and management of MTBE impacted sites, Portland, OR. NGWA.

June 22-23, 1999 Water Quality: Don't Let It Slip Through the Cracks, 1999 State Water Planners Conference, Rochester, MN. Contact: Bea Hoffmann, SE MN Water Resources Board, (507)457-5223, hoffmann@vax2.winona.msus.edu

June 22-25, 1999 Computer modeling of natural attenuation and bioremediation systems, Atlanta, GA. NGWA.

September 10-11, 1999 AIPG/MGWA/AWG Annual Fall Field Trip. North Shore. Watch for details.

September 12-16, 1999 PC Applications in Risk Assessment, Remediation Modeling, and GIS, San Francisco, CA. NGWA.

September 15-16, 1999 Design and Construction of Wells, Columbus, OH. NGWA.

September 14-16, 1999 Natural attenuation of fuel hydrocarbons and chlorinated processes, monitoring and modeling with BIOSCREEN and BIOPLUME II, Boston, MA. NGWA.

September 14-16, 1999 7th Symposium on the Chemistry and Fate of Modern Pesticides, Lawrence, KS. Contact E. Michael Thurman (785)832-3564.

September 17, 1999

ASBOG exam for geologist licensure. Application deadline: July 17, 1999. Contact Board of AELSLAGID (651)296-2388.

September 23-24, 1999 Prevention, Rehabilitation and Maintenance for wells, Knoxville, TN. Contact: NGWA.

October 5-6, 1999 Assessment and management of MTBE impacted sites, Chicago, IL. NGWA.

This Newsletter brought to you by:

Tom Clark, Editor-In-Chief tom.p.clark@pca.state.mn.us
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Charles Tiller ctiller@amengtest.com

MGWA Newsletter Deadlines for 1999

Issue	Copy to Editor	Copy to Publisher
September (v. 18, no. 3)	8/6/99	8/13/99
December (v.18, no. 4)	11/5/99	11/12/99

October 5-6, 1999 Natural attenuation for remediation of contaminated sites, Chicago, IL. NGWA.

October 7-8, 1999 NGWA Midwestern Focus Ground Water Conference, Schaumburg, IL. NGWA.

October 13-15, 1999 Midwest Ground Water Conference, St. Paul, MN. Contact Sarah Tufford, Minnesota Department of Natural Resources, (651)297-2431, or e-mail sarah.tufford@dnr.state.mn.us.

October 16, 1999 Council of Soil Scientist Examiners (CSSE) exam to qualify for professional licensure. Application deadline: Aug. 16, 1999. Contact: Board of AELSLAGID (651)296-2388.

October 18-20, 1999 Visual MODFLOW: The most widely used software package for MODFLOW, MODPATH, and MT3D, Philadelphia, PA. NGWA.

October 19-20, 1999 Principles and concepts of geostatistics for environmental applications, Philadelphia, PA. NGWA.

October 21-22, 1999 Comprehensive ground water management using Microsoft Access, Philadelphia, PA. NGWA.

October 25-28, 1999 GSA Annual Conference, Denver, CO. Contact: GSA

November 1-2, 1999 Fundamentals of ground water geochemistry, Minneapolis, MN. NGWA.

November 3-5, 1999 Practical applications of ground water geochemistry, Minneapolis, MN. NGWA.

November 7-10, 1999 Fourth USA/CIS joint conference on environmental hydrology and hydrogeology: hydrologic issues for the 21st century: ecology, environment and human health. American Institute of Hydrology (AIH), Cathedral Hill Hotel San Francisco, CA. Contact: AIH.

Contacts:

for NGWA events:

601 Dempsey Road
Westerville, OH 43801
1-800-551-7379 or
www.h2o-ngwa.org

for Nielsen Environmental Field School events:

4686 State Route 605 S.
Galena, OH 43021
(614)965-5026
(614)965-5027 (fax)
email: nielsenfieldschool@juno.com

for Geological Society of America events:

3300 Penrose Place
PO Box 9140
Boulder CO 80301-9140
www.geosociety.org

for Princeton's events:

PO Box 273776
Tampa, FL 33688-3776
(813)964-0800, (813)964-0900 (fax)
www.princeton-groundwater.com;
email: info@princeton-groundwater.com

for AIH events:

American Institute of Hydrology
2499 Rice Street, #135
St. Paul, MN 55113-3724
(651)484-8169, (651)484-8357 (fax)
<http://www.aihydro.org>
email: aihydro@aol.com

MGWA Board Minutes, cont.

March 4, 1999

Location and Time — Egg & I, University and 280, St. Paul, MN, 7:30 a.m.

Attending — Paula Berger, Past-President; Jim Piegat, President; Jan Falteisek, Secretary; Lee Trotta, Treasurer; Jeanette Leete, Sean Hunt, WRI; Leigh Harrod, Advertising Coordinator.

Approval of Minutes — Jim Piegat called the meeting to order at 7:30 am. Minutes for the regular Board meeting held February 4, 1999 were approved as corrected.

Treasurers Report — Jennie Leete provided a Profit/Loss statement for the first two months of 1999. There are currently 416 paid members. Jennie noted the difficulty of tracking members that work in consulting companies. WRI will send follow up dues invoices to second addresses if one is listed in the membership database.

Membership — Membership outreach strategies were discussed, including contacts within firms and calls to confirm current and past members. Jennie will provide a list of members to Lee Trotta for follow up. Jim Piegat asked WRI for a membership list sorted first by company and then by length of member-

ship. Specific ideas to contact students were also discussed such as giving a mug to each new student member and more attractive ways to post membership information in academic departments. Several themes were suggested; the theme "Meet Your Future Employer" was thought to have potential.

Spring Conference — Jim Piegat noted that speaker invitation letters had gone out but no responses had been received to date. The conference has been announced in the MGWA newsletter (at press). Jennie noted the MN History Center facility was booked for April 30th and most site logistics set. A number of people will be needed 7 am on April 30th for registration. Registration deadline will be Friday April 23rd. Jennie suggested an approach to contact and confirm agency speakers. Jim Piegat will send a conference agenda with suggested topics to each agency head; he will then follow up with phone calls.

By March 29th speakers need to be confirmed and a brochure ready to mail. The announcement and registration information will also go out via e-mail and fax. Sean will provide Jim Piegat with examples of previous announcements.

Lee Trotta suggested adding the

conference title to the stage setup. Leigh Harrod asked about media contact. Ideas for media contacts were discussed.

AIPG Coordination — Jennie noted that she was awaiting call back from AIPG regarding scheduling a meeting.

Midwest Ground Water Conference — Jan reported on progress of the Midwest Ground Water Conference. She noted it was unclear at this time whether a vendor area would be available and whether the MGWA would host the mixer at the start of the conference.

Scholarships — The Board approved \$230 for Bemidji State University to support a hydrogeology field trip to the University of Minnesota facility at Akeley. The Board also approved \$70 for student support for the fall field trip. The request from the Children's Water Festival was deferred.

Web Page — A number of questions were asked about using the web site. The costs for on-line registration and dues payments were discussed. Web committee members will work with Sean to update the posted material.

Next meeting — The next Board meeting will be Thursday April 1, 1999, 7:30 a.m. at Egg & I.

Meeting adjourned 8:55 am.

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**. 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 _____

MGWA Board Minutes, cont.

April 1, 1999

Location and Time — Egg & I, University and 280, St. Paul, MN, 7:30 a.m.

Attending — Jim Piegat, President; Jim Lundy, President-Elect; Jan Falteisek, Secretary; Lee Trotta, Treasurer; Jeanette Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor; Leigh Harrod, Advertising Coordinator.

Approval of Minutes — Jim Piegat called the meeting to order at 7:30 am. Minutes for the regular Board meeting held March 4, 1999 were approved as corrected.

Treasurers Report — Jennie Leete provided a current balance sheet and a Profit/Loss statement for the first three months of 1999. Net income for 1998 was \$6,619 with total assets of \$24,930. Lee Trotta will look into options for investment of CD's as they come due.

Membership — Sean Hunt provided an updated membership report. Membership outreach strategies were again discussed and Lee provided a list of new organization leaders and supplementary con-

tacts. Leigh said she was getting the mailing list for the licensed geologists. The follow up billings to second addresses, if one, had not yet been done. Jennie will provide an updated list by agency and representatives from those agencies are to cross check the lists.

Fall Field Trip — Jim Lundy reported on plans for the trip. The trip to sites along the North Shore is tentatively scheduled for September 10-11. Jim Lundy also noted that the Brainerd area and surface - ground water interactions has been suggested for the 2000 fall field trip.

Birdsall-Dreiss Lecture — Jennie will send \$50 to Mark Person, University of Minnesota for refreshments.

Web Page — Sean Hunt reported on work to update the MGWA web page.

Spring Conference — Jim Piegat reported on speakers for the conference: the Governor's office will not be able to confirm attendance until early April. Confirmations have been received from Minnesota Planning, Natural Resources. Health and Metropolitan Council confirmations seemed close. Lee Trotta said he

would contact Agriculture. Jim Lundy said he would contact the PCA commissioner personally. BWSR had not yet responded. Preparation of the flyer was discussed and assignments made for mailing lists. The flyer must be mailed during the first week in April. The pre-registration deadline is April 25. Leigh said she would help with registration at the conference. Conference packet preparation was discussed, including the types of handouts. One hundred of each need to be provided. Lee said he could obtain a selection of fact sheets from the USGS in that quantity. A pre-conference meeting will be held at WRI on Sunday April 18 at 2 p.m.

MGWA stationery — Sean reported he had redesigned the stationery to replace the P.O. box with the correct address. New stationery will be printed on the same buff paper as before but that white envelopes will be used due to the cost difference for colored envelopes.

Next meeting — The next Board meeting will be Thursday May 6, 1999, 7:30 a.m. at Egg & I.

Meeting adjourned 9:00 am.

Newsletter Advertising Policy for 1999

Display ads:

Size	inches H x V	Quarterly Newsletter	1999 Membership Directory
		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.

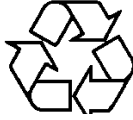
E-Mail notices:

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 publication deadlines: 14 February, 16 May, 15 August, or 14 November. 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 "MGWA." Direct your orders and questions to Leigh Harrod, Advertising Manager: 220 Bell St. Excelsior MN 55331-1812, *Phone:* (651)602-8085; *email:* mn_homebase@worldnet.att.net

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