

Minnesota Ground Water Association

www.mgwa.org

Volume 19, Number 1: March, 2000

President's Column

by Jim Lundy, Minnesota Pollution Control Agency

To prepare my first President's Column, I reviewed several past newsletter issues. Usually each president pleads at least once for more participation from the membership. Let me do my part. During my naive year as President-Elect, I marveled at how much of this organization's important work is volunteered. For instance, I saw some pretty tired looking volunteers cleaning up after last fall's geophysics conference, and I remember thinking it wouldn't have been a bad idea to skip the cleanup and just rig up some explosives (we could say that it was a 3-D seismic survey gone awry). You can prevent such poor judgment by others in the future by volunteering to help out.

Anyhow, on January 1, 2000 I began my term as the President of the Minnesota Ground Water Association; Jim Piegat became the past-president, and Jim Stark became the new President-Elect. I still think we could stage a coup d'etat, and transform the organization to the "JGWA"-Jim's Ground Water Association.

I know nobody is interested in the "M-word" anymore, but I lay awake one recent night wondering whether Piegat was the last MGWA president of the second millennium (in which case I, Lundy, am the first of the third millennium)? Or am I (Lundy) the last president of the second millennium (in which case Stark will be the first of the third millennium)? It does look as if I (Lundy) may be the only MGWA president with an ambiguous determination of the millennium in which I serve, a challenge that I welcome.

These days there are even more important challenges facing our organization (let's leave it as "MGWA" for

now). One important new challenge is raising and donating more money for ground water education than we have in the past. The MGWA board of directors hopes to accomplish this by creating a nonprofit foundation (probably called the "MGWA Foundation") that could receive tax-exempt donations as a 501(c)3 public benefit corporation. Many MGWA members already contribute extra dollars at membership renewal time to fund student scholarships (MGWA gave over \$800 to geology departments in 1999). But current circumstances prevent individual donors from deducting these donations to MGWA as charitable contributions.

Donations to the MGWA Foundation will be deductible as charitable contributions, and we believe this will encourage more members to donate. Furthermore, the MGWA Foundation would be able to ask for money from other foundations to carry out our educational and scientific objectives. Hence, we will be able to support student field trips, scholarships and other activities in ground water to an even greater extent than we currently do. Check future MGWA newsletters for more news on this development, and contact me if you can share ideas or expertise in the area of non-profit foundations.

In case you haven't noticed, we are recognizing the value of membership surveys. We surveyed the attendees of last fall's conference, and more recently the membership on general attitudes toward the organization. These surveys may be a pain, but they are a valuable tool the board uses to figure out whether we're on the right track. For instance, the fall conference surveys indicated that you learned a lot during a welcome day away from work in a conference room that was kind of uncomfortable

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Program Evolution at the Minnesota Geological Survey

by Dr. David L. Southwick, Director

Introduction

Most MGWA members presumably have used the products and services of the Minnesota Geological Survey (MGS) at one time or another, or at least know that MGS exists. Earlier in your careers, some of you may have confused the MGS with the U.S. Geological Survey (USGS), and perhaps some of you still do. If you didn't once confuse us with the Feds, maybe you thought we were an agency of state government, possibly a unit of the Department of Natural Resources. Wrong! The MGS actually is an applied research and public service unit of the University of Minnesota. Even though we live apart, our administrative home is in the Department of Geology and Geophysics, in the Institute of Technology.

History and Philosophy

The MGS was established March 1, 1872 by a legislative act which

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Upcoming Newsletter Deadlines

Issue	Copy to Editor	Copy to Publisher
June (v19/2)	5/5/00	5/12/00
Sept. (v19/3)	8/4/00	8/11/00
Dec. (v19/4)	11/3/00	11/10/00

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President's Column, cont.

at a price that was just about right (summarizing just a bit).

The more general membership survey is summarized elsewhere in this newsletter, and is displayed in full on the MGWA web page www.mgwa.org. We learned that most members think that MGWA membership is worth the \$20 annual dues. (Did you know that the per-member cost to run MGWA has increased steadily even though the dues have remained \$20 for many years?) You praised the newsletter, while the spring and fall conferences drew medium-high reviews. Your opinions on the field trips were somewhat mixed, from "neutral" to "satisfied", and you gave us some good ideas for future conference topics and field trip destinations. And your message that we need to give more money to students came through loud and clear. We expect the MGWA Foundation to address that issue.

But don't think the MGWA board can do it alone! This organization can be strong — but not without a lot of work. Maybe a little bit from everyone would be enough — so volunteer! Write a technical or Capillary Fringe article for the newsletter (contact Tom Clark, newsletter editor). Work on field trip logistics for next fall (contact Jim Stark, President-Elect and field trip coordinator). Dream up a local network of ground water professionals who would like to speak to grade school classes (contact me on this one). Ask how you can help to get the spring conference ready (or safely cleaned up; talk to Jim Piegat, Past-President and conference coordinator). You know where to reach us (see sidebars on pages 2 and 3). Please call or write if you can help with any of these efforts, or others you might have in mind.

Support Your Association — Invite A Student to Join

MGS Program Evolution, cont.

instructed the Board of Regents of the University to organize a geological and natural history survey of the state and appropriated funds for the purpose (General Laws of Minnesota, 1872, Chapter 30). Section 2 of the act stated that the geological survey should be undertaken with a "... view to a complete account of the mineral kingdom as represented in the State. . ." Sections 7 and 8 required that maps and reports be prepared to convey the results of the geologic studies, and that these be distributed widely to the general public and the Legislature.

Since 1872 the MGS has been striving to deliver a full and credible account of the "mineral kingdom" in Minnesota. Because water is a naturally occurring, inorganic, crystalline solid in Minnesota during much of the year, and is, therefore, a mineral by generally accepted definition, the MGS for decades has interpreted its charge to include investigations of Minnesota's water resources. We are quite confident that the 1872 legislators understood the phase diagram for H₂O and therefore thought it superfluous to mention liquid water specifically in their instructions to the university regents.

In Minnesota, as in most other states, the state geological survey was among the first public entities to be organized explicitly for scientific purposes. Spurred by 19th-century socio-political fervor to conquer the wilderness, develop natural resources, and create wealth, governors and legislators were eager to assess their domains. Geologists were hired and field studies were initiated with the expectation that mineral deposits would be found to assure everlasting riches and water supplies would be identified to assure bountiful crops year after year. Of historical importance, however, was the fact that most states selected academic directors for their geological surveys and gave them broad latitude to conduct their studies in accordance with sound scientific principles. The

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Results of MGWA Elections

The MGWA is pleased to announce results of the 2000 officers elections. Jim Stark is the new President-Elect and Jan Falteisek returns for another term as MGWA's Secretary. Contact information for all officers is found in the sidebar on this page.

James R. Stark

I'm a Supervisory Hydrologist with the US Geological Survey in Mounds View. I manage the National Water Quality Assessment Program and the



data programs in the Minnesota District. I got my undergraduate degree at UMD and did my graduate work at Wisconsin. My own technical workload is mostly related to ground water quality. I've also worked for the Survey in Utah and Michigan. When my time is my own I like to run and coach youth sports.

Jan Falteisek, P.G.

I received my MA in Geology in 1984 from the University of Missouri-Columbia and have been working in public sector environmental geology and hydrogeology since the late 70's. I've been at the Minnesota Department of Natural Resources for the past ten years, and six years before that at the Minnesota Pollution Control Agency. I'm currently working on the County Geologic Atlas and Regional Hydrogeologic Assessment Program,



a joint program with the Minnesota Geological Survey. For more information, check the web pages at http://www.dnr.state.mn.us/waters/programs/gw_section/cgarha/index.html and <http://www.geo.umn.edu/mgs/maplink.html>.

Response to Charles Tiller's December 1999 Capillary Fringe

by Robert E. "Butch" Pendergast, Pendergast GeoEngineering, Inc.

I want to share some thoughts about soil classification in reference to Charles Tiller's article in the December, 1999 issue. My background includes many years as a consulting engineering geologist and a geotechnical engineer, with extensive experience in soil classification and logging.

I agree that the Unified Soil Classification System has shortcomings. On the other hand, it is a very useful tool. Among its main benefits are speed of application and widespread usage. It is an efficient method for identifying and classifying soils into groups of materials whose geotechnical properties (strength and compressibility) are generally similar within each group and generally dissimilar from those in other groups.

Other soil classification systems, existing or future, may be better, especially for non-geotechnical applications such as geohydrology. I suggest that the best (only?) way to get any such system adopted and used in a meaningful way is to have it

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The primary objectives of the MGWA are:

- 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; and
- Disseminate information on ground water.

MGS Program Evolution, cont.

objective of creating collective wealth from the natural resources of the land dovetailed perfectly with the missions of the land-grant universities that were springing up in states west of the Allegheny Front. Thus, many state geological surveys were organized within their state universities, and several, including Minnesota's, have remained there.

Meaningful basic research was a significant outcome of the integration of surveys with academic institutions. The early surveys made fundamental contributions to geomorphology, stratigraphy, paleontology, regional structural geology, economic geology, and other subdisciplines. However this basic work was not conducted independent of geography and practical considerations. It sprang from and contributed to the fundamental charge to decipher the geology of a place so that economic "good" might be enjoyed. The MGS tries to perpetuate that heritage. We consider our role to go beyond the mere delivery of geological information. New ideas and insights that expand the general comprehension of Minnesota's varied geology remain our most important products. Those new ideas and insights should enhance the state's economy in the long run by contributing to wealth in the material sense, and also to the quality of the environment in which we live.

Until about 30 years ago, geological accomplishments in the Lake Superior region (Minnesota, Wisconsin, Michigan, and northwestern Ontario) were measured mainly in terms of knowledge gained about the Precambrian rock record and the economic productivity generated — new mineral deposits discovered, new mines opened, and the tonnage of mineral commodities produced. This political and economic environment dictated the thrust of MGS activities and strongly influenced the research agenda of the Department of Geology at the University of Minnesota.

In recent years, globally mushrooming human populations have increased the competition for land, water, and mineral resources, and planning for the conservation and

wise use of these has become a major expectation of today's public officials. The concerns of society in the Lake Superior region for sources of safe drinking water and the availability of recreationally suitable lands and surface waters have eclipsed concerns about the availability of gold, copper, or gravel. As a direct result, environmental issues now drive geological survey programs. At MGS, we now devote fully three fourths of our professional effort to topics that in one way or another relate to hydrogeology and environmental land-use issues.

Despite current public indifference toward mineral commodities, good resource-management policy must acknowledge the legitimate place of the mining industry in today's world. The mining industry provides materials that are vital to modern society, and is capable of producing them in an environmentally responsible manner. Mineral resources are where they are, regardless of inconvenience or human desires to have them in someone else's back yard. Mining operations should be factored into long-range environmental planning, and should be permitted if mining plans pass appropriate scientific and public review.

Current MGS Activities : General Comments

Many MGS products are intended to aid the public and its decision-making officials in allocating land, water, and mineral resources. Two of these — County Geologic Atlases (CGAs) and Regional Hydrogeologic Assessments (RHAs) — are familiar to most practicing Minnesota hydrogeologists and will not be discussed at length (Fig. 1). It is worthwhile emphasizing that (1) CGAs and RHAs

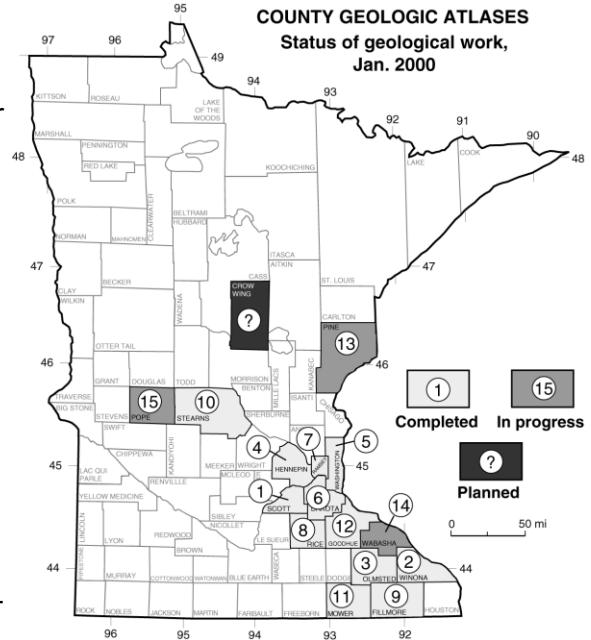


Figure 1a

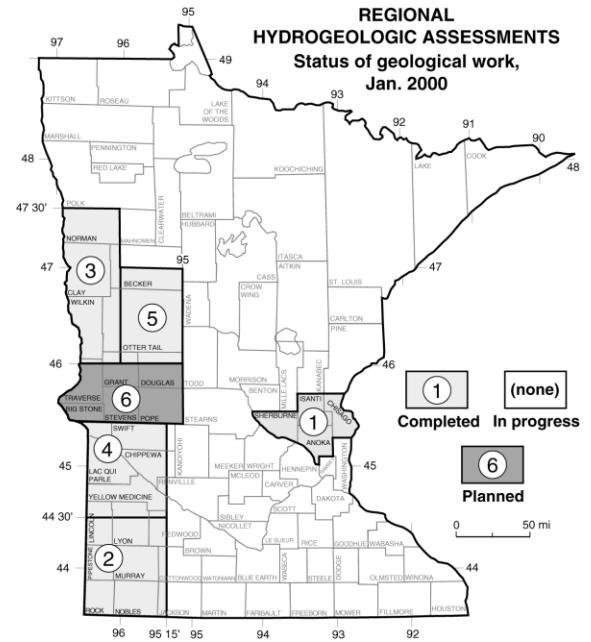


Figure 1b

Figure 1 — Status of CGA and RHA production (1a and 1b, respectively). Status shown only for MGS components of projects; DNR components (hydrogeology) necessarily lag behind MGS components (geology).

Numbers indicate sequence of completion.

are produced jointly by MGS and DNR Waters; (2) those produced since 1993 are available in GIS formats; and (3) the published and soon-to-be published CGAs and RHAs cover approximately 49% of the land area of Minnesota where approximately 73% of the state's population resides. The long-term goal of the program is to cover the main population growth corridors, the sand plains, and the agricultural lands of the state with either CGA or RHA mapping in a reasonable period of time.

Other MGS geologic mapping activities may be less well known to the MGWA community. These include (1) the STATEMAP program, funded by the USGS as a 50:50 federal-state co-op; (2) mapping projects recommended by the Minnesota Minerals Coordinating Committee (MCC) and funded from the Minerals Diversification Account administered by the DNR; and (3) mapping projects funded individually by various state and county agencies or by the MGS itself, from its base operating budget. In addition to these mapping endeavors, the MGS conducts a variety of derivative research projects on many specialized topics. Many of these bear directly on environmental or hydrogeological issues.

STATEMAP

The STATEMAP program started in 1992 with passage of the National Cooperative Geologic Mapping Act by Congress. The act was reauthorized in 1997 and again in 1999; it currently operates through the 2005 federal fiscal year. Its fundamental premise is that geologic maps are critical to sound resource management, and that the production of geologic maps is therefore in the interest of the nation.

Operationally, the national task of geologic mapping consists of two parallel efforts: to produce new detailed maps at scale 1:24,000 in GIS-ready format, and to capture older geologic maps by recompiling them digitally at scale 1:100,000. The first effort addresses the need for detailed geologic mapping in critical areas, whereas the second will lead eventually to a nationwide database of geologic mapping that is organized on the

basis of standard 30' x 60' topographic quadrangles. The mapping task is further divided into three program elements: FEDMAP, the production of maps on federal lands or in areas deemed to have federal significance (USGS responsibility); STATEMAP, the production of maps for areas that the individual states accord mapping priority (state responsibility), and EDMAP, a program to support the university training of new geologic mappers (university responsibility). All three elements are coordinated administratively.

Mapping priorities under STATEMAP are set by mapping advisory committees in each state. The Minnesota committee consists of five members; one each from the DNR, the state agencies other than DNR, MGWA, the local section of AIPG, and the Minnesota Exploration Association (MExA). These people meet annually and pass their recommendations for mapping to MGS. MGS then applies for funding support through a competitive process that is open to all 50 states and the Commonwealth of Puerto Rico. The funding pie is sliced for a given fiscal year, and the application process is repeated the next year.

To date, the Minnesota STATEMAP projects have focused on mapping surficial materials in the urbanizing corridor between Rochester and St. Cloud (Fig. 2). Starting in July, 2000 we will break from that mold by mapping the surficial geology of three 7.5 minute quads in the Brainerd area.

MCC projects

The Minerals Coordinating Committee consists of 10 members, one each from DNR Division of Lands and Minerals, MGS, NRRI, MPCA, IRRRB, U of M Institute of Technology, United Steelworkers of America, the iron-ore/taconite industry, the nonferrous metallic minerals industry, and the industrial

minerals industry. These people meet several times a year to receive, screen, and fund research proposals from groups at DNR, MGS, and NRRI, to receive reports from agencies and the minerals industries, and to develop coordinated strategies for legislative action pertinent to the minerals sector. Projects funded through the MCC process obviously are relevant to minerals issues, but they address many hydrogeological factors involved in mine design, environmental monitoring, and mine closure in addition to the geological and metallurgical factors associated with mineral exploration and processing. The overarching goal is to promote an environmentally responsible mining industry in Minnesota.

Most of the MCC work undertaken by the MGS has been geological and geophysical mapping in areas thought to be prospective for mineral deposits. It has emphasized "hard-rock" studies in northern and east-central Minnesota (Fig. 3), but has included the mapping of Quaternary materials near the Rainy River and the delineation of construction aggregate

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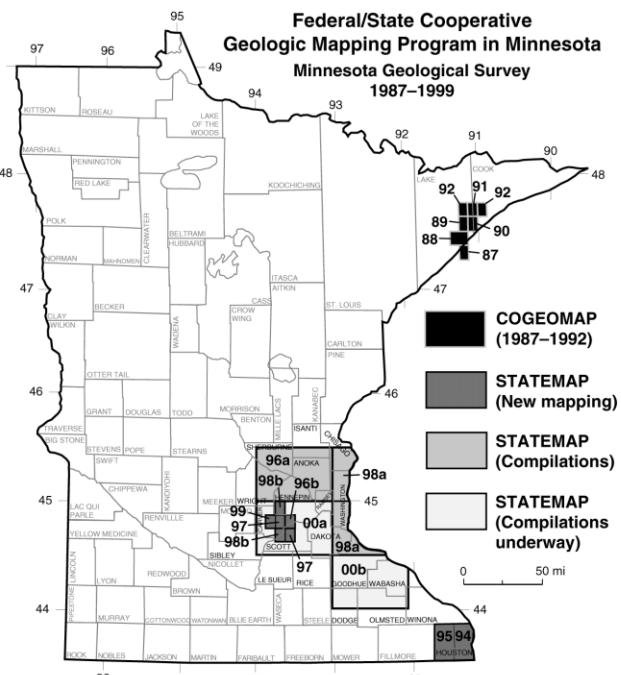


Figure 2 — Minnesota STATEMAP products by year.

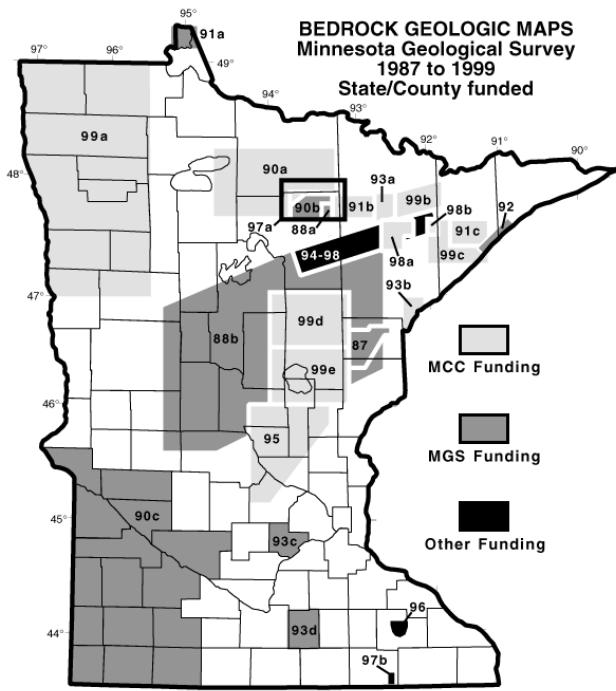


Figure 3a

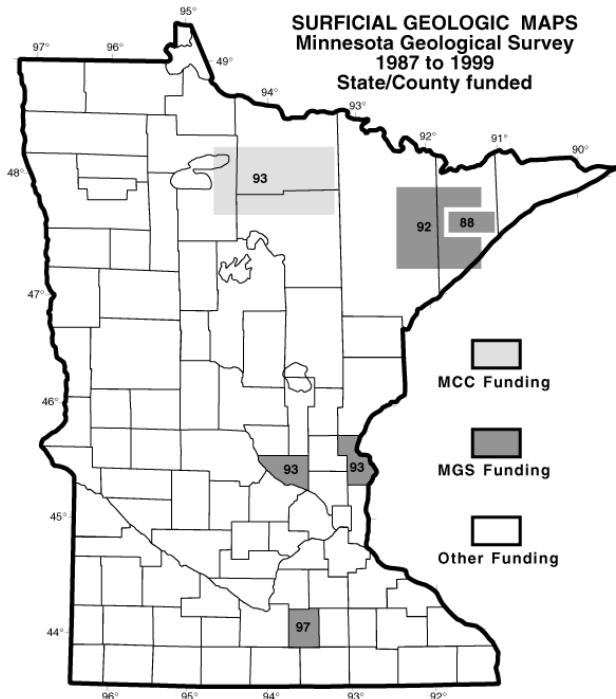


Figure 3b

Figure 3 — Mapping projects undertaken with state, county, and local funding since 1987. Excludes CGA/RHA and STATEMAP output. Bedrock projects (3a) are distinguished from Quaternary projects (3b). Numbers indicate year of publication.

resources in the Seven County Metropolitan Area. Our current MCC projects are (1) a geological and geophysical compilation and summary of the entire Duluth Complex; (2) an aggregate inventory of Chisago County; (3) a bedrock geologic map of the Eagles Nest quadrangle in the Vermilion district; and (4) development of a database of MGS publications and unpublished holdings.

Other MGS Projects

The MGS is constantly on the lookout for funded projects with state and federal agencies, county and local agencies, and the private sector. At any given time we have five or more of these underway, and the majority of them are primarily hydrogeologic. In addition, we fund a limited number of projects internally through our university base budget.

At the present time we are cooperating partners with the DNR on a major LCMR-supported project to understand the interactions of surface hydrology and near-surface hydrogeology of mined lands on the western Mesabi range. We are continuing with several inter-related projects on the hydrogeology of the Mississippi River corridor between St. Cloud and Little Falls that are funded through the Minnesota Department of Health by the U.S. Environmental Protection Agency. We are doing a regional recharge study of the Seven County Metropolitan Area in cooperation with the USGS and the involved county governments. We are obtaining new understanding of ground-water flow in the

Prairie du Chien Group through down-hole hydrogeologic testing (LCMR support). We are cooperating with various entities to develop a modified hydrostratigraphic framework for southeastern Minnesota. We are even thinking about delving into the infamous University Library Access Center site on the West Bank and doing a hydrogeologic post mortem. Time will tell.

Postscript

The MGS greatly appreciates the professional cooperation it has received from the MGWA membership over the years. We welcome your continuing suggestions and support, and invite you to visit our website (<http://www.geo.umn.edu/mgs>) or offices if you have questions or comments on the information presented above.

Capillary Fringe Response, cont.

accepted and promulgated as an ASTM standard. ASTM has its faults, but having the ASTM "seal of approval" is the only realistic way to have a system adopted and used in professional technical applications.

In the 1960s, I developed the system for geologic classification of soils that is used by many in the soil drilling and testing industry in Minnesota. Because the type of geologic deposit usually has a strong influence on the engineering properties of the soils, it is helpful to identify the geologic deposit or "origin" of a material, in addition to the conventional soil classification. My objectives in developing the nomenclature system included having the terminology simple, meaningful for geotechnical applications, and reasonably understandable to the layperson reader. Thus, for example, the term "coarse alluvium" is intended to encompass all water-deposited sediments which are dominantly sandy/gravelly, because they generally serve as suitable foundation bearing materials for most structures, regardless of whether a more scientifically correct name may be fluvial, outwash, glaciofluvial, deltaic, etc. In a similar fashion, "fine alluvium" in-

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Capillary Fringe

Living in the 00's (Zeros)

by Lee Trotta

The new millennium has arrived (depending on your counting system). What will it mean? How will our lives change? Certainly technological advances will be rapid and hard to predict. Perhaps I can give some insight on changes in the water supply situation expected in the next decade.

Shortages of basic necessities will become very real in certain geographic areas. Wood and water shortages will occur in the U.S. Southwest,

the Caribbean, and parts of Africa. Grain shortages in India will cause much hardship. "When the well's dry, we know the worth of water", said Benjamin Franklin about two and a half centuries ago.

The solutions to these shortages may not occur within the first decade of the millennium. Where water is concerned, the solutions are hard. Countries or States facing water stress must either be lucky enough to find an untapped resource within their borders or negotiate a transfer of water from without. Today 31 countries face water stress or water scarcity (Hoffbuhr, 1999b). This means about 20% of the world's population does not have access to drinking water (Hoffbuhr, 1999a). By the end of the zeros, another eight countries will probably join the list.

Finding an untapped resource is difficult when those water supplies have become increasingly polluted. The gains seem minimal when compared to the growing demand. Water resources within any particular geographic area are essentially finite. The concept of sustainability encompasses the notion that population (and their demands) in a geographic area should only grow to the point where use of available resources does not exceed natural replenishment. In spite of seasonal fluctuations, no more lakes or streams are likely to be found. The only hope for most States (or countries) lies in undiscovered ground-water resources. These hopes are pinned on scientific surveys and advanced well design.

The U.S. Geological Survey is the premier agency in this country for conducting surveys of ground-water resources. State water agencies and environmental consulting firms also perform similar functions. Consulting firms usually restrict themselves to short-term cookie-cutter site investigations for individual cities in order to produce work at a profit (Elsenheimer, 1999). Scientific surveys by State agencies usually concentrate on economically critical areas within their State.

Advanced well design allows more efficient water supply no matter where the resource lies. Well screen manufacturers guide the process with laboratory analysis of soil material for

proper sizing of screen opening, matching screen material to well application and corrosiveness of the water. New designs of sintered polyethylene will allow extraction of more water from fine-grained aquifers. In geographic areas where productive aquifers do not exist, populations will have to take their chance with easily polluted surface supplies or purchase of water from other political entities.

Politically negotiated transfers of water do not happen overnight and entail ethical questions. Although the first baby steps have already occurred in the Great Lakes Charter and the San Bernadino Water Transfers, there are no guarantees for interbasin transfer.

Shortages can mean economic benefit for the geographic areas still having supplies to sell. These benefits may be short-lived, however, if a policy of sustainability is not in place. The search for new ground-water supplies will likely be most successful in Third World countries of the African, Asian, and South American continents.

An area like Minnesota will never run completely out of water. Within its borders lie the headwaters to many of the Nations major rivers ... a freshwater lake (Mille Lacs Lake) larger than the island of Kauai, that is teeming with fish ... and a series of glacial and bedrock aquifers that would make Perrier jealous. The largest of the Great Lakes, Lake Superior, makes up its northeast border. The dry southwest corner of Minnesota, however, will negotiate to import water from other States before the end of the decade.

Those areas whose plans for sustainability are effective will begin to see population growth because living elsewhere will become unbearably expensive. How long can the attraction of warm temperatures hold people in Phoenix when the well runs dry ...

The zeros will usher fast-paced changes — some awe-inspiring and some scary. Although improved access to information will touch every

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A Look Back

Editor's Note: Your newsletter team recently asked former MGWA President Ray Wuolo, a consulting Geologist for Barr Engineering Co., to discuss how the business of ground water consulting has changed in the last 15 years or so. Ray took us up on the challenge and here is his response:

Well, it's the Millennium (± 1 year, which is only an error of 0.1 %), and everyone is a historian or a futurist. MGWA has availed me of the opportunity to join in by posing me with a question: How has ground water consulting changed in my 15 or so years of practice? The answer, of course, is graph paper – I don't use graph paper anymore. There was a time, not so long ago (really!) when I couldn't get enough of the stuff; semi-log paper, log-log paper, probability paper, ternary diagrams. Now, I use the pre-printed grid on my computation

pad to constrain my doodles while I wait for the lawyer on the other end of the phone to get to the point. I wonder, what's changed for that guy?

The tools I use have certainly changed but the concepts (and the problems) that I work with are about the same. We contour (now we use Surfer), we draw maps (now we use ArcView), we perform pumping tests (now we use pressure transducers and data loggers), we collect ground water samples (now I have someone else do that for me). I'm still trying to answer the same questions that were posed when I first started in this business – where is ground water flowing and what will happen to the contaminants?

But, oh those tools! I occasionally hear one of my colleagues say something to the effect that it's all eye candy and no substance. Sometimes it is only eye candy, but most of the advances of the past two decades have added substantially to our ability to both understand ground water flow/contaminant transport and to convey that information to a broader audience. So, here's my top-ten list (in no particular order) of the most significant changes of the past twenty years.

1. Push-point sampling (e.g., GeoProbe) and mobile labs. What a wonderful luxury to mobilize a drilling crew and obtain ten or twenty samples and water-level measurements in a single day! In many settings, GeoProbe will never substitute for more permanent monitoring wells but they have provided us with the ability to quickly collect a large amount of high-quality data and at substantially lower cost than drilling.

2. Computer contouring and geostatistics. For a long time, computerized contouring was looked down upon because it ignored the interpretations of the geologist. True enough, but sometimes that's not such a bad thing. The widespread use of contouring programs and the knowledgeable application of geostatistical methods, such as kriging, are now common place. For my money, Surfer is one of the best and most versatile programs I've ever used.

3. Desktop GIS. Of course, I'm talking about ArcView. What started out as a cool way to create pretty maps has become a vehicle for understanding the spatial relationships of different types of data and for managing large data sets. Along with 3-D visualization and animation, GIS represents a powerful tool for conveying complex hydrogeologic information to non-scientists (a skill we could all use help with).

4. GUIs (a.k.a Graphical User Interfaces). Excuse me! Human beings are visual creatures – just ask Bill Gates – he made 80 billion dollars because he understood this. Digital ground water flow models have been around for over 30 years but they were inaccessible to anyone without a strong foundation in FORTRAN programming. The advent of the GUI, which allowed model data and model results to be entered and evaluated visually (and quickly) made ground water flow modeling almost commonplace (which it should be). Credit Otto Strack for much of this – SLAEM was about the first model to take this approach and much of its success can be attributed to a GUI that was well ahead of its time.

5. State-wide databases. I have had the fortune to practice hydrogeology in several states. Nowhere is there more high-quality, user-friendly electronic data than in the Land of 10,000 Lakes. It continually amazes me how much GIS-compatible data can be downloaded from the Internet (often for free). Foremost in my mind is the County Well Index database. Michigan is the only other State I can think of that has something comparable.

6. DNAPL. The concept of Dense Non-Aqueous Phase Liquid as a source of ground water contamination is only about 15 years old, yet it completely transformed our understanding of the appropriateness of the most common ground water remedy – pump-and-treat systems. From the concept of DNAPL came a new management strategy for some ground water contamination sites – contain the plume because removing

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A Look Back, cont.

the source was not technically feasible. The first question to ask is: Is it a sinker?

7. Natural attenuation. Natural attenuation (a.k.a. intrinsic bioremediation) used to be called "the no-action alternative." The widespread recognition that organic contaminants can breakdown naturally in the ground water to less-toxic forms has made the no-action alternative a more palatable option. In a way, it's nature's answer to pump-and-treat hydraulic containment – only cheaper. The plume must be allowed to spread out some in order for biodegradation to keep pace with the source. Part and parcel with natural attenuation is the concept of risk-based approaches to remediation, which provides the regulatory framework for the acceptability of intrinsic bioremediation. Unfortunately Minnesota has something called Rule 7060, which seems to prohibit the degradation of Waters of the State and does not allow natural attenuation the space it needs to do its thing.

8. Automated parameter estimation. For my money, this is one of the most important methods to come about in the last 20 years and a tool we are only beginning to scratch the surface with. In a nutshell, automated parameter estimation allows us to calibrate models to an extent unthinkable only five years ago. The method frees the hydrogeologist from the mundane task of trial-and-error testing and lets him/her become the evaluator of concepts and hypotheses.

9. VIC/Brownfields. What a concept! Instead of spending millions of dollars on legal fees, why don't we use the money to clean up properties and put them back on the tax roll? Voluntary Investigation and Cleanup is helping to make partners of business and government. Now, I know not everybody likes that idea but what is the alternative?

10. Spreadsheets. It never ceases to amaze me what I can do with a spreadsheet program. The macro languages in these programs are extremely powerful (and very foreign to anyone who cut their teeth on FORTRAN). Without a spreadsheet, I

would feel like I was armed with stone tools and bear claws.

Of course most of the above changes would not have occurred had it not been for the explosive advance of higher speed, higher memory PCs. The PC and the Internet have changed the hydrogeologist's world forever and I have no doubt they will continue to be the drivers for the next 20 years. Look for even more complex ground water models (maybe not always a great idea) that coupled stream flow, unsaturated flow, solute transport, GIS, and real-time global positioning. In the next few years, I believe we will see a low-priced *in situ* method for treating BTEX and chlorinated solvents to below detection limits quickly and permanently. And we will see a new dawn, as the world comes to embrace a yet unborn application for my graph paper – perhaps on Antiques Roadshow.

MGWA Membership Survey Results

To get a direct measurement of members' level of satisfaction with MGWA as an organization, the MGWA board of directors circulated a membership survey at the end of 1999 as a part of the membership renewal process. The survey inquired members' attitudes (ranked from 1 "completely dissatisfied" to 5 "completely satisfied") on a variety of topics, including the quarterly newsletter, policy and technical conferences, field trips, and the level of support MGWA gives to ground water education. A total of 56 members responded to the questionnaire.

Your responses are summarized below. The survey results are posted in their entirety on the MGWA web page, located at www.mgwa.org.

Newsletter

Members responding were generally positive about the newsletter. Of those with written comments, many said they enjoyed the whole newsletter. Many liked the technical articles, the main article, the President's letter, and the Capillary Fringe column. Members found advertising and the business meeting notes of the least value in the newsletter. Some with

written comments wanted to see more color in the newsletter and a more cross-disciplinary bent with more diversity of authorship.

Conferences

Members responding rated the conferences on average a 4 out of 5, with 5 being most satisfied. The yearly Fall technical conferences received a higher rating than the yearly Spring policy conferences. The overall value of MGWA conferences was rated high.

Field Trips

Field trips were well received. The lowest rated aspect of field trips were the logistics, which averaged neutral to slightly satisfied.

Education

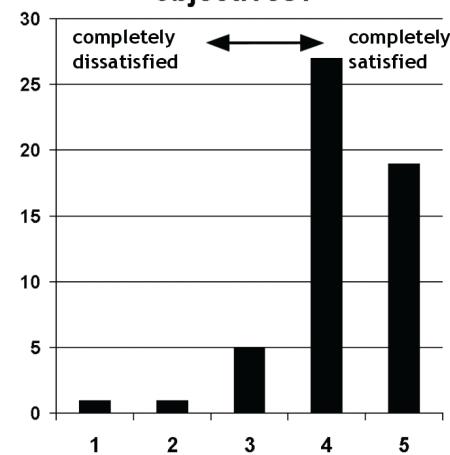
Respondents seemed OK to pleased with the level of support given to education and professional events when directly asked. However, some the written responses to "What is MGWA's greatest missed opportunity" were related to education.

MGWA

Most members responding had been MGWA members for more than 5 years, many for more than 10 years. Most people responding worked in consulting or government.

Members overwhelmingly thought that membership in MGWA is worth the dues spent. 83% were satisfied or somewhat satisfied that MGWA is meeting its objectives.

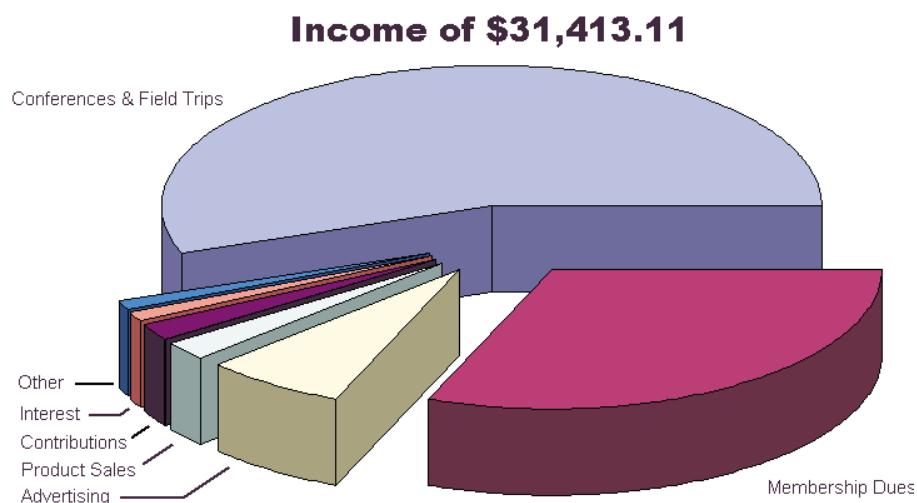
Does MGWA meet its objectives?



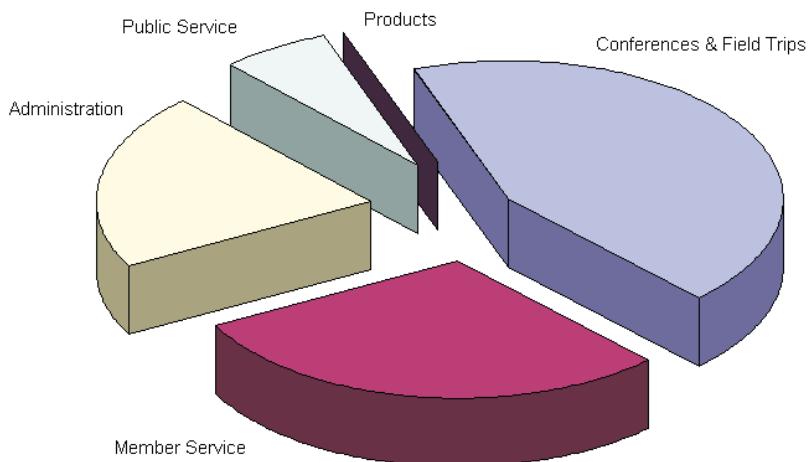
Treasurer's Report

by Lee Trotta, MGWA Treasurer

The year 1999 came to a close with the MGWA showing signs of good financial health amidst a time of change. The pie chart shows the distribution of 1999 income and expenses resulted in a small net profit. The total income has risen steadily over the years from \$23,680 in 1996 to \$31,220 in 1999. Net income (profit) does not increase annually. As expenses go up, the officers seek new ways to be sure the income keeps up. Membership dues have been held constant since 1995 despite rising costs. Per member costs of running MGWA are now \$31.69. Non-dues income (mostly advertising and revenues from conferences) makes up the difference. Investments were switched from money market funds to FDIC-insured certificates of deposit this year, which gain a higher rate of interest. Several membership services have been shifted to the website in an attempt to save on postage and gain more exposure among the computer-literate. Counteracting these efforts, membership surveys indicate a desire to increase scholarships offered and keep conference fees low. To this end, the officers are currently working on creating an MGWA foundation to fund public benefit activities. Donations to MGWA Foundation would be tax deductible as charitable contributions and would likely increase our outreach abilities. Thank you for supporting the efforts of the organization!



Expenses of \$30,584.41



Continuing Education: Minnesota Statute 326.107

by James C. Balogh, PhD, PSS

Introduction

The Board of AEISLAGIDand many of the professional societies representing our licensed or certified professions have been very strong supporters of continuing education. Each profession recognizes the vital need to continually update and enhance our understanding of our work. In the last legislative session, the Board worked with both the House and Senate of the Minnesota legislature to enact legislation for continuing education in Minnesota. After arduous work by the Board, legislative authors, and supporting professional associations, Minnesota Statute 326.107 was enacted by both the House and Senate. Governor Ventura signed the bill on May 24, 1999. The continuing education bill was based on the recommendations of the public task force on continuing education for the professions licensed or certified by the Board. The effective date of the bill is August 1, 1999. The following is a brief review of the provisions of the continuing education statute.

Continuing Education Requirement

Continuing education is required for all professions licensed or certified by the Board. Professionals licensed or certified by the Board must obtain a minimum of 24 professional development hours (PDHs) of continuing education per biennial renewal period. One PDH means an educational contact hour of not less than 50 minutes. The initial period for obtaining the first 24 PDHs is from August 1, 1999 to June 30, 2002. You will have an additional 11 months to obtain continuing education PDHs for the renewal period of July 1, 2000 - June 30, 2002. In future renewal periods, you may carry over up to a maximum of 12 PDHs from a prior renewal period.

Programs and Activities

Based on the continuing education task force recommendation, continuing education must consist of

— continued on next page

Continuing Education, cont.

learning experiences which enhance and expand our skills, knowledge, and abilities in order to remain current and render competent professional services to the public. Remember, the entire purpose of the licensing program is to protect the health, safety, and welfare of the public. Therefore, a well-rounded continuing education program includes technical, non-technical, regulatory, ethical, and business practice needs as related to protection of the public. Continuing education activities which satisfy the professional development requirement include, but are not limited to, the following:

1. Completing or auditing college sponsored courses.
2. Completing self-study college or non-college sponsored courses presented on the Internet, television, video, or audio, ending with examination or other verification processes.
3. Participation in seminars, tutorials, televised or videotaped courses, or short courses.
4. Attending self-sponsored and prepared in-house educational programs.
5. Completing a study tour with a structured program resulting in a written or visual presentation by the licensee or certificate holder.
6. Presenting or instructing qualifying courses or seminars. PDHs may be earned for preparation time for the initial presentation.
7. Authoring published papers, articles, or books. PDHs are earned for preparation time, but are claimed only after publication. PDHs may be earned for authorship or presentation, but not for both.
8. Participation in professional examination grading or writing (Maximum of five PDHs per renewal period).
9. Providing professional service to the public which draws upon the professional's expertise on boards, commission, and committees such as planning commissions, building code advisory boards, urban renewal boards, or non-work-related volunteer services (Maximum of 10 PDHs per renewal period).
10. Patents, after they are granted (Maximum of 10 PDHs per renewal period).

Criteria for Continuing Education Activities

Continuing education activities must have a clear purpose and objective that maintains, improves, or expands the skills of the professional. For example, technical, regulatory, or ethics training at professional society meetings can meet this criteria. The sessions regarding professional society business or social gatherings at these meetings do not meet the continuing education criteria. The content of acceptable continuing education presentations must be well organized and presented in a sequential manner. There must be evidence of pre-planning which must include the opportunity for input by the target group receiving the instruction.

It is very important for both continuing education providers and professionals to remember that participation in a continuing education activity must be documented. Continuing education providers should consider providing participants in the educational portions of meetings with a signed certificate which includes the date, activities, sponsor, time, name of the participant, and a summary of other requirements discussed in the section on reports and records.

Continuing education activities are not limited to those given in Minnesota. As long as supporting documentation is obtained, continuing education activities are not limited by geographic location.

Reports and Records

Professional licensees and certificate holders must keep records of their continuing education activities. Records or documentation of activities must include dates, subjects, duration of programs, sponsoring organization, PDHs earned, registration receipts where appropriate, and other pertinent documentation. These records must be kept for two years after submission to the board. This information may be audited by the Board. The Board in its random audit process may require the

professional to produce the continuing education information. Documentation on continuing education activities also may be requested by the Board during a renewal application or a complaint alleging noncompliance on the part of the professional.

As part of the license renewal process, the Board will supply a form for the licensee to submit a summary of their continuing education activities. This form must be completed with sufficient detail to permit audit verification by the Board.

Noncompliance

A licensee or certificate holder who does not satisfy the continuing education requirements for a renewal period will be placed on probationary status. The probationary professional then has 180 days after notification by the board to substantiate the originally claimed PDHs or to earn other PDHs to meet the minimum requirements. PDHs earned in the probationary period can not be applied to the next renewal period. An individual who applies for a license or certificate renewal after the biennial renewal period has lapsed and has not satisfied the continuing education requirement shall be notified by the Board. The licensee or certificate holder again has 180 days to substantiate the original claim for PDHs or earn PDHs to meet the minimum requirement. If the continuing education deficiencies are not made up in the specified time period, the individual's license or certificate will be suspended.

Exemptions

A licensed or certified professional is exempt from the continuing education requirement for the following reasons:

1. A licensee or certificate holder is exempt for the individual's first biennial renewal period after first becoming licensed or certified.
2. A licensee or certificate holder who has experienced a serious illness, injury, or other extenuating circumstances (during the biennial period), as reviewed and approved

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AIPG Annual Meeting will be in Milwaukee, WI

October 12 and 13, 2000 — Call For Presentations

LEARNING FROM THE PAST — DIRECTIONS FOR THE FUTURE

The practice of geology has evolved dramatically during the last decades of the 20th Century. The AIPG Annual Meeting presents an opportunity to highlight the lessons learned and speculate on what may, or should be, important as the profession of geology enters the next millennium. The practice of geology now encompasses areas that include the expertise of other professionals and interests of diverse stakeholders. Interdisciplinary participation is therefore encouraged. Abstracts for presentations are requested in 5 topic areas:

Suburban Growth and the Fate of Extractive Industries. We will focus on the intersection of society's mineral needs with population growth highlighting resource mapping, extraction, urban planning, and conflict resolution.

Geology's Role in Property Transfers and Brownfield Development. Reuse of urban, developed lands is a growing priority where geologists define the risks and opportunities.

New Techniques in Subsurface Investigations. Presentations on what works and what new tools are on the horizon are solicited.

Environmental Corrective Action. Presentations highlighting what has been learned from risk-based cleanups, the best of the technological developments, or where geology should be leading corrective action into the 21st century are encouraged.

Slope Stability. Urban development, mineral extraction, corrective actions often take place in areas where geological considerations of slope stability play a significant role and the successful and safe completion of projects.

Geology Education for the Next 10 Years. The changes in geology that are part of the topics presented above provide an outline of need for the next decade. We seek presentations that can help the next generations of professions be ready for successful careers. Student poster sessions will be featured at the meeting.

Abstracts of 300 words or less (1 page) are due by 13 May 2000. Presenters will be notified and provided with instructions for presentations and registration by 7 July 2000. Please include the name, address, telephone number, fax number and e-mail address of the presenting author. Abstracts can be submitted to Bernd Rehm, RMT, Inc., 744 Heartland Trail, Madison, WI, 53717-1939

In addition to the presentations and student posters, there will be short courses presented on the following topics:

Ethics, liability, and litigation in geology

Geographic information systems for geologists

Unraveling the complexities of glacial hydrostratigraphy

ISO 14000

The meeting will close with several field trips

Sand and gravel pits, quarries, and suburban growth. This half-day trip will visit local facilities that show the effects of suburban growth on expansion capabilities and groundwater problems.

Shore erosion and bluff stability along the Lake Michigan shoreline. This day long trip will look at areas in the Milwaukee metro area that have been subject to development for many years. A variety of failure types will be viewed as well as successful and unsuccessful attempts at dealing with stability problems.

The Badger Army Ammunition Plant (BAAP) and the Baraboo Hills. A day long trip to the BAAP will highlight the issues of reuse of formerly used defense facilities. Remedial actions and future land use issues will be pre-

2001 AIH meeting to be Held in Minnesota

The 2001 meeting for the American Institute of Hydrology (AIH) will be held right here in Minneapolis. And the local section of AIH has the honor of organizing (and running) the meeting. I have agreed to take on the responsibility to chair the organization of the planning activities. So guess what, I need help! Big time!

If you are interested in actively participating in the organization of the 2001 meeting, please send me an E-mail indicating your interest and also tell me what type of responsibility you would prefer to have (local arrangements, program planning, publications, local bouncer, public relations, etc.).

By the way, one preliminary meeting title that Ken Brooks, Roman Kanivetsky and I came up with is "Hydroscience: Challenges for the 21st Century". Sounds great! Thanks very much.

John L. Nieber, Professor, Chairman, AIH 2001 National Meeting, Biosystems and Agricultural Engineering, University of Minnesota, St. Paul, MN 55108, (612)625-6724, nieber@gaia.bae.umn.edu

MDH Well Conference, March 29, 2000

The Minnesota Department of Health, Well Management Section, will hold its annual Well Conference on Wednesday, March 29th at the Thunderbird Hotel in Bloomington. Sessions include such topics as: finding lost wells and well sealing, the Wisconsin Grouting Study, well chlorination, vertical heat exchangers, environmental tracers, and rotosonic technologies. Six continuing education credits will be available for the renewal of full, limited, and monitoring well contractor licenses and registration. Cost of the conference is \$65. For more information, contact Kim Benson-Johnson at (651)215-0816.

MN Department of Health Activities Concerning Radon in Water and Air

As many as 400 utilities may be affected by the radon rule proposed by the U. S. Environmental Protection Agency (EPA). The Minnesota Department of Health recently performed a survey to determine the occurrence of radon in approximately 200 public water systems. The systems chosen to be surveyed provided a variety of geological settings, system configurations, and geographical distributions. The purpose of the survey was to identify, from a statewide perspective, the levels of radon occurring in public water systems. As a result of the survey, MDH estimated that approximately one-third of the community water systems in the state would exceed the proposed maximum contaminant level (MCL) of 300 picoCuries per liter (pCi/l). However, utilities in Minnesota may not be required to comply with the 300 pCi/l MCL; if the state adopts an Indoor Air Program, intended to reduce overall exposure to radon gas, water systems will have a much less strict standard to meet.

What is radon?

Radon (Radon-222 or Rn) is a gas that has no color, odor, or taste and comes from the natural radioactive breakdown of Uranium-238 and Radium-226 (usually within the soil). But we've also found that some supplies can create radon during treatment through the breakdown of radium that is retained on filter media.

Exposure

You can be exposed to radon from two primary sources: groundwater and air (both indoor and outdoor air). Most of the radon in indoor air comes from soil underneath the home. Radon in soil seeps into the house and into the air. In addition, outdoor air contains background levels of radon from soil gas. As for radon in water, exposure occurs through ingestion as well as through breathing radon released from the water into the air when the water is running. It is estimated that exposure from radon in groundwater causes approximately 168 cancer deaths per year in the United States. Of these, it is estimated that 89 percent are from lung cancer (from breathing radon released from the water into the air) and 11 percent from stomach cancer (from ingestion).

Health risks

Breathing radon is the second leading cause of lung cancer (after smoking). When you breathe radon, the radioactive particles get trapped in your lungs. As those particles break down, they release small bursts of energy. This can damage lung tissue and increase your chances of developing lung cancer. Drinking water containing radon can cause cancer in internal organs, primarily the stomach.

Proposed rule

The radon rule a complex one, since it addresses radon occurrence in both air and water. The EPA has proposed an Alternative Maximum Contaminant Level (AMCL) in drinking

water of 4,000 pCi/L for those states that adopt an Indoor Air Program. For those states that do not adopt an Indoor Air Program, an MCL of 300 pCi/L will be required.

More than likely, Minnesota will adopt an Indoor Air Program, meaning that water utilities will need to meet the less-stringent AMCL of 4000 pCi/L. It's very possible that none of the community supplies will need to treat for radon since we have yet to find a supply in Minnesota that exceeds 4000 pCi/L.

What if I have questions?

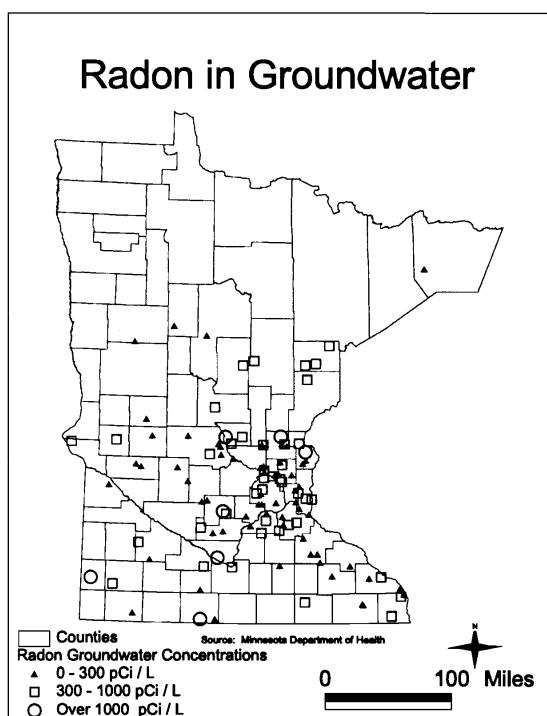
If you have additional questions about radon or the proposed rule, please contact Karla Peterson at (651)215-0761. If your questions regard radon in air, please contact David Jones at (651)215-0886.

MDH develops HBV for Total Petroleum Hydrocarbons

Minnesota Department of Health (MDH) has developed a health based value (HBV) for total petroleum hydrocarbons (TPH). The TPH HBV uses pyrene as a surrogate for the entire TPH range of contaminants. The TPH HBV (pyrene 200 micrograms per liter) is to be used for ground water contaminated with petroleum products. The precedent for this approach was established by the Massachusetts Dept. of Environmental Protection (see www.magnet.state.ma.us/dep/bwsc/vph_eph.htm) and was further refined by the Total Petroleum Hydrocarbon Criteria Working Group. The Working Group (members from academia, petroleum industries, and both federal and state agencies) documented their research in Total Petroleum Hydrocarbon Criteria Working Group Series (see www.aehs.com). This methodology divides the entire TPH range into fractions and assign a toxicity surrogate for each fraction.

The Minnesota Department of Health established an inter-agency state research group to obtain advice concerning exposure for total petroleum

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New From the US Geological Survey

WRI 99-4183. Hydraulic properties of the Prairie du Chien-Jordan aquifer, Shakopee Mdewakanton Sioux Community, southeastern Minnesota, 1997. By Ruhl, J.F. 10 pages.

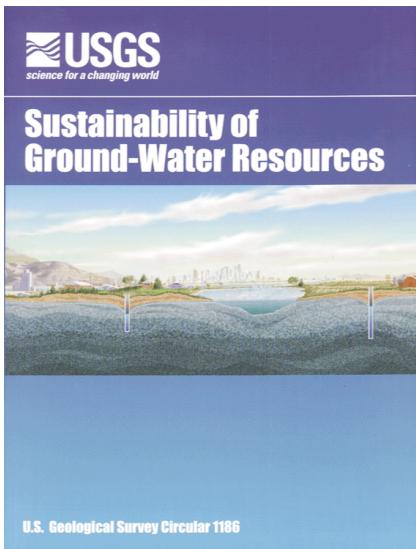
An aquifer test of the Prairie du Chien-Jordan aquifer was conducted in the Shakopee Mdewakanton Sioux Community located southwest of the Twin Cities metropolitan area. A well open to the Jordan Sandstone was pumped at 600 gallons per minute for 57 hours. Drawdown was monitored in three observation wells located near the pumped well. These wells were open to: (1) the Jordan Sandstone, the principal unit of the aquifer; (2) the Prairie du Chien Group, a secondary, carbonate-rock unit of the aquifer; and (3) a confined, glacial-drift sand aquifer. Test results indicate that the Jordan Sandstone had a transmissivity of 6,267 ft²/d, a storativity of 1.193×10^{-4} , a horizontal hydraulic conductivity of 31 ft/d based on a saturated thickness of 204 ft, and a ratio of vertical to horizontal hydraulic conductivity of 5.29×10^{-4} . The pumped well was hydraulically connected to the Prairie du Chien Group observation well. No drawdown was observed in the observation well completed in the confined, glacial-drift sand aquifer; thus, a hydraulic connection of this observation well to the pumped well was not indicated.

WRI 99-4206. Quantity and quality of seepage from two earthen basins used to store livestock waste in southern Minnesota during the first year of operation, 1997-98. By Ruhl, J.F. 35 pages.

Numerous earthen basins have been constructed in Minnesota for storage of livestock waste. Typically, these basins are excavated pits with partially above-grade, earth-walled embankments and compacted clay liners. Some have drain tile installed around them to prevent shallow ground and soil water to discharge into the basins. Environmental concerns associated with the waste include contamination of ground water by nitrogen compounds and pathogens.

The U.S. Geological Survey, in cooperation with the MPCA (Minnesota Pollution Control Agency), studied the quantity and quality of seepage from two earthen basins used to store livestock waste in southern Minnesota during the first year of operation. One basin (site A), located at a small dairy farm, holds a manure-silage mixture, milkhouse wastewater, and local runoff; the other basin (site B), located at a large hog farm, holds a manure-water mixture from a nearby gestation barn. Monitoring systems were installed below compacted clay liners in portions of the sidewalls and bottoms of the basins to determine the quantity and quality of the seepage.

C 1186. Sustainability of ground-water resources, by W. M. Alley, T. E. Reilly and O. L. Franke. 1999. 79 pages.



The pumpage of fresh ground water in the United States in 1995 was estimated to be approximately 77 billion gallons per day (Solley and others, 1998), which is about 8 percent of the estimated 1 trillion gallons per day of natural recharge to the Nation's ground-water systems (Nace, 1960). From an overall national perspective, the ground-water resource appears ample. Locally, however, the availability of ground water varies widely. Moreover, only a part of the ground water stored in the subsurface can be recovered by wells in an economic manner and without adverse consequences. Online version available at: <http://water.usgs.gov/pubs/circ/circ1186>

MDH develops HBV for TPH, cont.

hydrocarbons in ground water. Representatives from several state agencies are participating, including: MDH, Minnesota Pollution Control Agency, Minnesota Department of Agriculture, and Minnesota Department of Transportation. The Minnesota TPH work group is currently investigating how Minnesota might benefit by utilizing a fractionation/surrogate methodology to address petroleum-contaminated ground water in the state. The Minnesota TPH work group is also developing case studies in which the current MPCA methods of evaluation and a fractionation method will be applied, and the results compared. This exercise will familiarize the work group members with the details of application, and identify potential application concerns.

The Minnesota TPH work group recognizes that there is an overlap between the gasoline range organics and diesel range organics methods and establishing a consistent baseline is vital to quantitating TPH in ground water for the TPH HBV. For more information, e-mail the Minnesota TPH work group at tph-comments@health.state.mn.us.

In Memory of Eduard Henri Dahlberg (Henk)

Henk died on Monday, February 7 in Hibbing after a brief illness. Henk was born on May 4, 1940, in Suriname, South America. His father and mother were educators in Suriname and in the Netherlands. After his secondary education, he finished his studies in geology in 1969 at the Rijks Universiteit Utrecht in the Netherlands with a Ph.D. He worked as a geologist at the Geological Survey of Suriname, eventually serving as the director. Henk also served at a cabinet level position for the government of Suriname. In 1983 Henk received a Hubert Humphrey Fellowship and came with his wife Tine and son Guido to the United States. Henk

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Modification of Special Well Construction Area Twin Cities Army Ammunition Plant

In 1996, the Minnesota Department of Health (MDH) designated a Special Well Construction Area (Well Advisory) incorporating the Cities of New Brighton, St. Anthony and portions of Arden Hills, Columbia Heights, Falcon Heights, Fridley, Lauderdale, Minneapolis, Roseville, and Shoreview, which are located in Anoka, Hennepin, and Ramsey Counties. The Special Well Construction Area incorporated two areas of ground water contamination related to volatile organic chemicals (VOCs) contamination at, and around the Twin Cities Army Ammunition Plant (TCAAP) in Arden Hills. The largest area of contamination extends several miles to the south and west of TCAAP, to depths of several hundred feet. Portions of the buried sand aquifer (Hillside Sand formation) and the Prairie du Chien

dolomite and Jordan sandstone bedrock formations have been contaminated with VOCs, principally trichloroethene (TCE). A second, much smaller area of VOC contamination exists in the surficial sand deposits (Fridley formation) north and west of TCAAP to depths of approximately 45 feet.

In June 1999, the Minnesota Pollution Control Agency requested that the MDH extend the Special Well Construction Area boundary for the larger contamination plume farther to the southwest to the Mississippi River in Minneapolis, and Marshall Avenue in St. Paul. The eastern boundary of the extension area is Cleveland Avenue, between Larpenteur Avenue on the north and Marshall Avenue on the south. The western boundary of the extension area is a continuation of Central Avenue to the Mississippi River. The boundaries of the original area north of Larpenteur Avenue and Hennepin Avenue remain unchanged. The revised boundaries of the Special Well

Construction Area are shown on the accompanying map.

Wells within the Special Well Construction Area may not be constructed or modified until after the MDH has reviewed and approved plans for the proposed activity. Wells completed in or below the Prairie du Chien dolomite may not be sealed until after the MDH has reviewed and approved plans. Plans for well construction, well reconstruction, or well sealing may be submitted to Patrick Sarafolean (651-215-0826) at the MDH metro district office in St. Paul.

Continuing Education, cont.

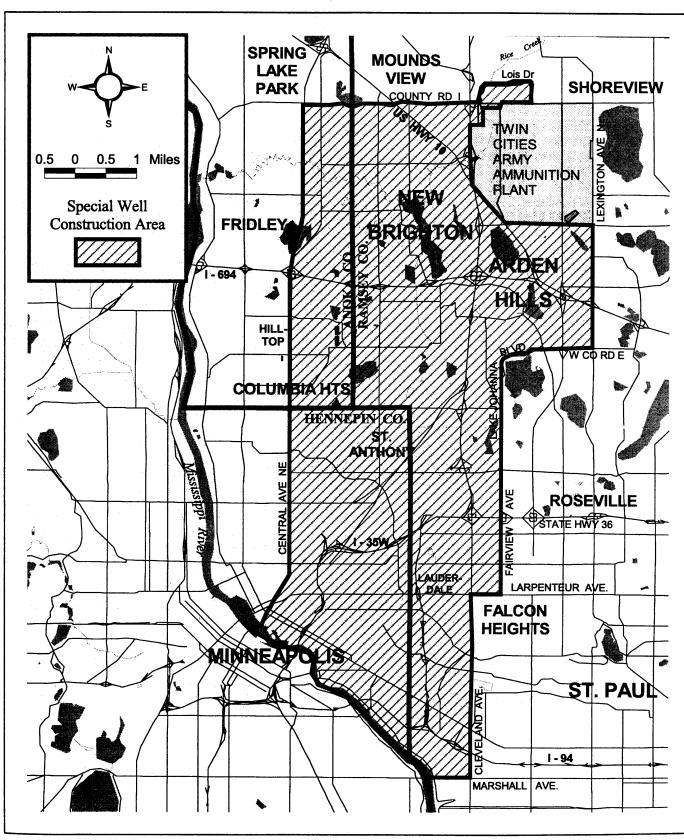
by the Board. Supporting documentation must be provided to the Board prior to the end of the renewal period to qualify for this exemption.

3. A licensee or certificate holder who for a period of time exceeding 120 consecutive days serves honorably on active duty in the military where such activity restricts participation in a continuing education program.

Summary

Continuing education is a condition required for license renewal. All licensees or certificate holders should take this seriously. Recent reports suggest that the half-life of a college degree ranges from 3 to 5 years. Whether we practice professionally in government, academia, industry, or the private sector, we should take pride in our status as well-trained professionals. The continuing education requirement should not be viewed as an additional burden. We should use this opportunity to document our professional integrity and pride. Certainly the laws of physics have not changed. However, our ability to manipulate and interpret these "laws" changes constantly. Continuing education is a way to remain in touch with the constant evolution of professional practice.

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In Memory of Henk Dahlberg, cont.

and his family settled in Hibbing in 1984 to work for the Minnesota Department of Natural Resources, Lands and Minerals Division as the manager of the Mineral Potential Unit.

Throughout his life, Henk loved geology. He was active in many organizations focusing on mineral resources, such as the Mesabi Range Geological Society. Henk has been active in Small Scale Mining International as vice president, and continued his activity in international consulting for developing countries. He served as a lecturer for the United Nations on several occasions, and participated in World Bank initiatives in small scale mining issues. Locally, Henk has been an active member of the Rotary International and had a keen interest in earth science education in the community and public school system.

It is rare to discover a previously unknown mineral, but in the early 1990's, while examining bedrock in the DNR's Drill Core Library in Hibbing, Henk discovered a new mineral. It was recognized by the International Mineralogical Association and named Hibbingite.

He will be missed.

MGWA Board Meeting Minutes

November 4, 1999, 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; Jeanette Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor; Leigh Harrod, Advertising Manager.

Approval of Minutes – Jim Piegat called the meeting to order at 7:35 am. Minutes for the regular Board meeting held October 7, 1999 were approved with corrections.

Treasurers Report – WRI provided updated accounting reports. Sean showed an example of how membership renewal by e-mail from the MGWA would work.

After testing, this will be used for 2000 membership renewals.

Birdsall-Dreiss Lecture – The movie "A Civil Action" will be shown today at the UM Geology Dept. and the lecture by Scott Bair will be tomorrow, November 5.

Fall Conference – Jim Lundy went over the arrangements. After discussion of whether presenters should pay registration fee, it was concluded that for the fall conference presenters would not be expected to pay unless they expect to get CEU's. It was agreed that a written policy on this matter needs to be prepared and will be included as an agenda item on the December agenda. Jim said he had collected speaker and presentation information for use by attendees needing CEU's. Program logistics were discussed to assure the program proceeded smoothly.

Election – Ballots will be due December 31. Results will be tabulated for the Board meeting on January 6, 2000.

Newsletter – The newsletter will include a page with the membership survey on one side and the 2000 officer election ballot on the other. Leigh Harrod said she was looking at advertising possibilities for the web and would like to experiment next year.

Scholarship Program – Paula said the scholarship letters were going out this month.

Minnesota Geologic Mapping Committee – Jim Piegat reported on the meeting held October 28, 1999. Jim said he would ask David Southwick for a newsletter item on the committee's work.

Meeting adjourned at 9:10 a.m.

December 2, 1999, 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; Leigh Harrod, Advertising Manager.

Approval of Minutes – Jim Piegat called the meeting to order at 7:35 am. Minutes for the regular Board meeting held November 4, 1999 were approved.

Fall Conference – Jim Lundy discussed preliminary results of the conference comments. He said the return rate was about 30 percent. He also noted that

conference proceedings were requested. A summary article for the newsletter was discussed and Jim said he would talk to the rest of the newsletter team the following week.

Scholarship Program – Paula said all the scholarship letters had been sent.

Scholarship Committee – A scholarship committee was established with Paula Berger and Leigh Harrod as committee members. They will report back to the board at least quarterly on scholarship requests and with recommendations. Paula will continue as primary scholarship contact for institutions.

Recognition – Leigh suggested an annual award, possibly a "Lifetime Achievement Award". This was deferred for discussion at a future meeting.

Student Education – In response to a summary of action items started but not completed last year by Jan, there was discussion on how this might be moved ahead. Jim Lundy said he would check back with Jan the following week on current student education programs by agencies and school districts to begin a collection of program information that the MGWA could coordinate with or expand.

Advertising – Leigh said she will be working with Sean Hunt on approaches to offering supporters/advertisers an option of placing their material on the web site. Leigh noted that the MGWA is losing hardcopy ads because of consulting company mergers and other changes.

Minnesota Geologic Mapping Committee – Jim Piegat said that David Southwick will prepare a newsletter item on the committee's work.

Meeting adjourned at 9:00 a.m.

January 6, 2000, Egg & I, University and 280, St. Paul, MN, 7:30 a.m.

Attending: Jim Piegat, Past-President; Jim Lundy, President; Lee Trotta, Treasurer; Jan Falteisek, Secretary; Jennie Leete, Sean Hunt, WRI; Tom Clark, Newsletter Editor; Leigh Harrod, Advertising Manager.

Approval of Minutes – Jim Lundy called the meeting to order at 7:38 a.m. Minutes for the regular Board meeting held

— *continued on page 17*

MGWA Board Meeting Minutes,

December 2, 1999 were approved with corrections.

Election Results – WRI reported election results. Jim Stark was elected President-Elect, and Jan Falteisek was elected Secretary.

Fall Conference Evaluation Results – Tabulated evaluation results were distributed to the Board followed by discussion.

Membership Survey Results – Tabulated survey results were distributed to the Board followed by discussion.

Treasurer's Report – Lee Trotta reported MGWA has \$642.95 net income for 1999. WRI provided updated profit/loss statements and balance sheets. WRI reported that only \$20 accounts receivable for 1999. The newsletter to include pie charts of income and expenses. Lee Trotta is to provide narrative for the context of the pie charts. Lee, Sean, and Jennie are to work together to develop the narrative.

Board Position Duties – Following a general discussion of Board position duties, the Board will consider for discussion at the next Board meeting examples of written duties provided by WRI.

Newsletter – Tom Clark reported on preparations for the next newsletter, which is planned to include an article on

the Minnesota Geological Survey, professional geologist continuing education, a response to a Capillary Fringe column, and introduction of new officers.

Old Business

Membership — A number of membership issues were discussed, including corporate membership, membership tracking, and membership recruitment. WRI suggested that membership issues be worked on in a committee and then brought to the Board for consideration and action. It was moved by Jim Piegar, seconded by Lee Trotta, and approved to establish a Membership Committee with the reporting officer to the Secretary. In addition it was moved by Jim Piegar, seconded by Lee Trotta, and approved to assign the issues of corporate membership, membership tracking, and membership recruitment to the Membership Committee.

AIPG coordination – The Board concluded no further action was required at this time.

Tax Status – WRI noted that MGWA was near to charitable status but was still a "chamber of commerce" type organization. WRI suggested formation of a charitable foundation for education. Jim Lundy to work with Jennie on development. Lee Trotta moved, Jim Piegar seconded, and it was approved to form a committee to

investigate the feasibility of creating a charitable foundation, with the reporting officer to be the President.

Spring Conference – Options for facility were discussed, including the Science Museum, MN History Center, and the MPCA Board room. In discussion, a variety of ideas were generated including the future of ground water, risk assessment, natural attenuation, delegation of well programs, water rights, water management policy, employment trends. After discussion the Board approved Water Law as the topic for the spring conference. Jennie will investigate facility options for the next Board meeting. Jennie will also call the MN Attorney General's office. A preliminary program based on Water Law was developed: 1. MN Water Law, 2. U.S. Water Law, 3. Water Law Changes, 4. Case Studies, 5. Delegation Issues. Jim Piegar and Jim Lundy will work to further develop topics.

MGWA 20th Anniversary – 2002 will be the MGWA 20th Anniversary.

State Fair Booth – Jim Lundy suggested a booth at a future State Fair.

Meeting adjourned at 9:15 a.m.

Next meeting – The next Board meeting will be Thursday, February 3, 2000, 7:30 a.m. at Egg & I.

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 2000**. Annual dues are \$20 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 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 _____

Which Address should we use for Mailings and for Directory Listing? _____

Which Telephone Number should we use for Directory Listing? _____

New LUST Fact Sheets

The Minnesota Pollution Control Agency (MPCA) Leaking Petroleum Storage Tank (LUST) program fact sheets are under revision. The LUST fact sheet revisions are not expected to fundamentally change the program, but will achieve a close alignment between program requirements and the risk based approach to site characterization and remediation. The revised LUST program fact sheets are expected to go into effect in May 2000, but will be available for review on the MPCA web page (http://www.pca.state.mn.us/programs/lust_p.html) prior to several scheduled Consultant Days in April 2000. For information on Consultants Day, please call Eva Johnson, 651-296-7276.

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.

March 28-30, 2000 "The Watershed Approach to Improving Water Quality: Fact or Fantasy", an Upper Mississippi River Conference sponsored by the West North Central Region of Soil and Water Conservation Society, LaCrosse, WI.

March 29, 2000 Minnesota Department of Health Annual Well Conference, Thunderbird Hotel, Bloomington, MN. Contact: Kim Benson-Johnson, 651-215-0816.

April 3-4, 2000 Applications of Health Risk Assessment for Environmental Decision Making, New Orleans, LA. Contact: NGWA.

April 3-7, 2000 Princeton Remediation Course, Las Vegas, NV. Contact: Princeton Ground Water.

April 5-7, 2000 Understanding Migration, Assessment and Remediation of Non-Aqueous Phase Liquids (LNAPLs and DNAPLs), New Orleans, LA. Contact: NGWA.

April 6-7, 2000 Geological Society of America (GSA) 34th Annual North

Central Section Meeting, Indianapolis, IN. Abstract deadline December 20, 1999. Contact: <<http://www.geosociety.org/profdev/sectdiv/Northc/00ncmtg.htm>>

April 11-14, 2000 PC Applications in Risk Assessment, Remediation, Modeling, and GIS, Orlando, FL. Contact: NGWA.

April 17-19, 2000 Third International Conference on the Analytic Element Method, Brainerd, Minnesota. Contact: <http://www.ce.umn.edu/AEMGroundwater>.

April 25-27, 2000 National Water Quality Monitoring Conference 2000, Hyatt Regency, Austin, TX. Contact: GWPC, 405-516-4972, jeff@gwpc.site.net, or <<http://nwqmc.site.net>>

April 25-26, 2000 Minnesota Water 2000 Conference: Status of Minnesota's ground and surface water as we enter the millennium, Minneapolis Convention Center. Contact: Tracy Thomas, Water Resources Center, 612-625-2282, or web page at <<http://wrc.coafes.umn.edu/water2000/>>

May 5, 2000 MGWA Spring Conference on Minnesota Water Law, Earle Brown Continuing Education Center, University of Minnesota. Contact Jim Lundy, MGWA President (see p. 3)

May 22-25, 2000 Geochemical Modeling of Aqueous Systems, Dallas, TX. Contact: NGWA.

May 22-25, 2000 Second International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA. Contact: The Conference Group, 1989 West 5th Ave. Ste 5, Columbus, OH 43212, 1-800-783-6338, conferencegroup@compuserv.com

May 25-26, 2000 Screening Modeling for Natural Attenuation with Bioscreen, Biochlor, and the NA Tool Kit, Dallas, TX. Contact: NGWA.

June 4-7, 2000 6th International In Situ and On-Site Bioremediation Symposium, San Diego, CA. Contact: Battelle Conference Office, 614-424-7604, biorecl@battelle.org

June 7-8, 2000 Emerging Issues Conference, Minneapolis, MN. Contact: NGWA.

June 12-13, 2000 Risk Based Decision Making: an Advanced

Quantitative Course, Minneapolis, MN. Contact: NGWA.

June 13-15, 2000 Principles of Ground Water, Minneapolis, MN. Contact: NGWA.

June 21-23, 2000 Geostatistics and the Data Quality Objectives Process for Environmental Remediation, San Diego, CA. Contact: NGWA.

June 22-23, 2000 Surface Geophysics (tentative title), San Diego, CA. Contact: NGWA.

June 26-27, 2000 Principles and Practice of Forced Air Remediation, San Diego, CA. Contact: NGWA.

June 26-28, 2000 GIS and Data Management for Ground Water Modeling (tentative title), San Diego, CA. Contact: NGWA.

July 30-August 2, 2000 ASCE Minneapolis 2000 Joint Conference on Water Resources Engineering and Water Resources Planning and Management, Minneapolis, MN. Contact: <http://www.mpls2000.asce.org/>

September 10-14, 2000 31st congress of the IAH (International Association of Hydrologists): New approaches to characterizing groundwater flow, Munich, Germany. Contact: <<http://agh.iaag.geo.uni-muenchen.de>>

September 15-18, 2000 2000 Theis Conference: Iron in Ground Water, Jackson Hole, WY. Contact: NGWA.

October 6-8, 2000 Advances in Site Characterization for Environmental and Engineering Projects at Glaciated Sites, Twin Cities (venue TBA). Contact: Dan Kelleher, Midwest Geosciences Group, 612-551-2435, or info@midwestgeo.com.

NGWA

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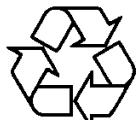
Princeton Groundwater

PO Box 273776
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813-964-0800; 813-964-0900 (fax)
Info@princeton-groundwater.com
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Nielsen Environmental Field School, Inc.

David M. Nielsen
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Mark your Calendar!
MGWA Spring Conference on
Water Law in Minnesota
May 5, 2000
Earle Brown Center
University of Minnesota