

Minnesota Ground Water Association

Volume 13, Number 2: July, 1994

U of MN Black Hills Field Trip

This spring, Professor Rama Murthy and four teaching assistants led a group of 38 honors students from the University of Minnesota to the Black Hills for a five day geology field trip. This trip was an integral component of GEO 3211H, an honors earth science class. Almost all of the students were sophomore and junior engineering students, and for most of them this was their first "hands on" exposure to earth science.

Our first stop was an overlook near Chamberlain, South Dakota where we could see the dramatic difference between glaciated and unglaciated terrain. We drove through the Badlands on our way to Rapid City and stopped to stretch our legs, explore, and discuss their formation.

Once in the Black Hills, we took advantage of the diverse geology of the region. We climbed both Bear Butte and Harney Peak to compare igneous rocks of different ages and origins. Mineral collecting at the Ingersoll Mine pegmatite exposures was a big hit among the students.

In Little Creek Canyon we got up close to the Deadwood Formation and the Pahasapa Limestone to hunt for fossils and sedimentary structures. These units are folded into a beautiful monocline at this location and it was a perfect place for the TAs to illustrate the use of Brunton compasses.

We took the Natural Entrance Tour at Wind Cave National Park where we had an excellent and knowledgeable guide. Later that afternoon, the excellent exhibits at the Mammoth Site in Hot Springs allowed the students to

—continued on page 2



University of Minnesota field trip to the Black Hills

President's Column

Earth Scientist Registration

A bill to develop registration for earth scientists was introduced in this year's legislative session. Wisconsin's legislature recently passed registration legislation. Several of the surrounding states now require registration for corrective action activities related to underground storage tanks. These events suggest that, like it or not, registration may become necessary for many of us to practice professionally in fields related to ground water. There are many reasons why some of our colleagues are pursuing registration. As an organization, MGWA does not plan on taking a position on this issue, but it is important that our membership have the information necessary to make an informed decision. We'll do our best to keep you posted on registration -- (see the article on page 4 of this issue on the status of registration in Minnesota) please let us know if you have a strong opinion one way or another and we'll publish your views as space allows.

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U of MN Field Trip, cont.

see paleontology in action.

Rounding out the experience were numerous shorter stops including Bridal Veil Falls to look at the resistant phonolite which holds up the falls, the Lead open pit mine and, of course, the obligatory stop at Mt. Rushmore!



University of Minnesota students at Wind Cave

President's Column, cont.

Fall Field Trip

As this newsletter went to press, details were being hammered out for this year's AIPG/MGWA Fall Field Trip. We are planning a 1 1/2-day trip to the St. Cloud area in mid-September (see page 5). St. Cloud has been the scene of many interesting ground water-related issues, and we hope to have a varied and interesting roster of speakers and stops. We're looking into stops and speakers for the area's granite quarries and glacial geology, NSP's Sherco powerplant, developments in areas constrained by the availability of uncontaminated ground water, and monitoring and planning activities related to the sandplain areas along the Mississippi River. A final agenda will be set by mid-summer.

All of us enjoyed the trip immensely and extend our sincere thanks to the Minnesota Ground Water Association for their help in making field trips of this nature accessible to undergraduates! Thank you, MGWA!

— Jennifer Kleck, Teaching Assistant,
Department of Geology and
Geophysics.

Outdoor Action Conference

Through the generosity of the National Ground Water Association we were able to set up an informational booth at the Outdoor Action Conference in Minneapolis in May. It was great to see many of our members and have the chance to recruit some new folks to our ranks. Many thanks to Gretchen Sabel, Jeanette Leete, Rich Soule, Bruce Olsen, and Larry Johnson for setting up and staffing the booth, to Peterson Well Drilling for loaning us the booth, to the MGS for supplying the geologic cores and maps, and to the MPCA for the ground water sensitivity maps.

Field Trip Scholarships

This issue contains reports on some MGWA-assisted field trips. MGWA's field trip scholarship program is in its second year and is obviously a success.

— Doug Connell, Barr Engineering Co.

Agricultural Drainage Wells

New Extension publication

The University of Minnesota Extension Service has produced a pamphlet on "Identifying and Sealing Agricultural Drainage Wells, by L. M. Busman, South Central Minnesota Water Quality Extension Educator [Document FO-6265-B 1993].

Agricultural drainage wells (ADWs) — also known as shallow injection or dry wells — have been used in some farming situations as a way to carry excess water from surface or subsurface drainage systems directly into deeper layers of the ground. ADWs threaten ground water quality because they allow agricultural runoff and seepage and the pollutants they may contain to feed directly into the ground water. Normally, natural filtering of runoff takes place as water seeps slowly through several layers of fine- and medium-textured soil before it reaches the ground water at the water table. This natural filtering is bypassed when an ADW is used, potentially polluting the ground water.

For landowners the presence of an ADW on one's property:

- threatens the health of family members, neighbors or livestock who must use this ground water for drinking, and
- puts the landowner at risk for significant financial liability should it be determined that the well introduced contaminants to ground water in violation of state law.

The State of Minnesota has given high priority to identifying and sealing ADWs to protect ground water quality. There are many resources available to help landowners accomplish identification and sealing in a way that causes as little financial hardship as possible. It is in a landowner's best interest to cooperate with the program and join in this effort because it is usually far less expensive to identify and properly seal an ADW in compliance with state law than to correct an improper sealing effort or to pay punitive damages for polluted ground water.

University of Minnesota Hydrogeology Field Camp

Plans are underway at the Department of Geology & Geophysics for a new annual field camp focusing on hydrology and hydrogeochemistry. The field camp will be conducted primarily at Williams and Shingobee Lakes in Hubbard County, Minnesota. It is an important component in the new hydrogeology program at the U, which features a three-quarter class succession.

The overall goal of the camp is to give students valuable field experience and apply the principles and methods studied during the school year. As such, the field camp is essentially targeted at upper-level undergraduate geology majors and graduate students. About 20 spaces are expected to be available in the first year, although this may increase in future years. The first camp is scheduled for the first two weeks in September, 1995.

The proposed list of activities includes ground water sampling, slug and pumping tests, well drilling, surface water-ground water interaction, and vadose zone hydrology.

Background and preparation work is being done this summer. Anyone interested in helping out with equipment or expertise, or with general questions should write, fax or e-mail for more information.

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Coors Funds The Groundwater Foundation

Coors Brewing Company, through Coors Pure Water 2000, presented \$12,000 to The Groundwater Foundation, headquartered in Lincoln, Nebraska, for its public education efforts. In addition, Coors will donate 25 cents to The Groundwater Foundation for each Pure Water 2000 symbol Nebraska consumers clip from 12-packs of cans of Coors beers. This promotion continues until September 30, 1994.

Licensed Site Professional Certification Begun in MA

The Commonwealth of Massachusetts under the Oil and Hazardous Waste, Chapter 21E Program has instituted the creation of the Licensed Site Professional (LSP) certification. It did so to place greater responsibility for site remediation in the private sector. The Program certifies LSPs to oversee and/or perform assessments or site cleanups. Once certified, LSPs have the ability to assess and clean up all but the most serious sites without waiting for government oversight.

All private parties who perform assessment, containment, or removal activities must retain LSPs to demonstrate that the work complies with the Massachusetts Superfund law and regulations. Any person who is or might be required to contribute to cleaning up a waste site should consider retaining an LSP; these may include owners, operators, potential buyers, former owners or operators, abutters, and financial institutions.

An LSP is an experienced professional in the field of hazardous waste site assessment, cleanup, and removal. The LSP must have at least five years experience conducting and overseeing assessments, removals, or cleanups of sites. According to the Massachusetts program, LSP issues Waste Site Cleanup Activity opinions related to presence of site contamination and work required to remediate contamination. The LSP also determines if remediation has been completed. These opinions are based on field assessment, sampling and detailed site study.

Individuals who meet the criteria for qualifications can become an LSP. "Standard Track" applicants must have a college degree in a technical field such as engineering or science. In addition, they must have eight or more years of total professional experience, at least five years of which must be experience relevant to the field of waste site cleanup.

— *Ground Water Monitoring & Remediation, Spring 1994*

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Gustavus Adolphus College Spring Trip

The Sedimentology/Stratigraphy class at Gustavus Adolphus College held its spring field trip in Iowa this year, going from the center of the state to the northeast corner (down section), and inspecting the stratigraphic section from Pennsylvanian down to the Cambrian. Six students participated in the trip, three of whom start graduate school in the fall, and all three of those in the hydrogeology field. The emphasis of the trip was to see a great variety of sedimentary rock types and also to get a feel for the regional variations in the physical stratigraphy.

We started the trip at the Saylorville spillway just north of Des Moines where we received permission from the Corps of Engineers to inspect the spectacular Pennsylvanian section ripped open and exposed by the over-top floods of 1993. Partial cyclothems sequences are exposed with perfect examples of every sedimentary rock one would find on a 101 rock and mineral test. Great tree fossils, climbing ripples, and invertebrate critters.

Our dogleg to northeast Iowa brought us to the Devonian at Bird Hill and Rockford (Home of Famous Devonian Fossils!) and we joined busloads of school children collecting the Cerro Gordo Member fossils.

We viewed the Ordovician Galena Group in the context of the regional ground water story around Elkader, Iowa where the Iowa DNR, Geological Survey Bureau, along with other state and local agencies, has been running the Big Spring Project, a holistic, integrated agricultural-surface water-ground water monitoring project. We visited some of the monitoring stations, stood in a Galena quarry and thought about "standing in the aquifer." and saw where it all gets spit out at Big Spring itself. This is a wonderful area to take an environmental/ground water field trip.

The highlight of this crystal clear end to the weekend was the sections near Guttenburg and Lansing, written up so nicely in the Geological Society of America DNAG field guides. We described sections in this area and camped out in the unexpected beauty of Pikes Peak State Park.

The class and the department at Gustavus Adolphus College wishes to thank the MGWA for its generosity in helping to make this extended trip possible.

— Mark Johnson, Gustavus Adolphus College



Gustavus senior Cara Larsen and junior Julie Fitzke inspecting the Whitebreast Coal at the Saylorville Spillway, Des Moines, Iowa.

Teacher Education

The Colorado School of Mines sponsors several summer teacher enhancement workshops, one of which has ground water studies as its focus. As part of the program, each teacher is provided with a teacher resource kit. To investigate future training opportunities, call the Teacher Enhancement Office at (303)273-3303.

— Denver Earth Science Project
Newsletter, Spring 1994

Update on Minnesota Geologist Registration

Geologist registration in Minnesota is moving forward on a number of fronts. In early 1994, the AIPG-CEC/M Ad Hoc Committee on Professional Practice of Geologists introduced a geologist registration bill (S.F. 2565) into the short legislative session to gain exposure for the bill.

The Committee is now making preparations to re-introduce the geologist registration bill in the upcoming 1995 legislative session and work toward passage of the bill. The Committee is lobbying for support and endorsements while at the same time working on developing draft rules for geologist registration. The Committee hopes to have draft rules developed before the registration bill is introduced to provide further clarification on the content of the registration language being proposed in the bill.

The Committee is open to participation by any individual. For more information about the Committee or the proposed registration bill, contact Bob DeGroot at 559-1900 or Robert Wahlstrom at 227-6500. If you are interested in helping to develop the draft rules, contact Kevin Powers at 490-1405.

— Robert Wahlstrom, AIPG-CEC/M
Ad Hoc Committee on Professional
Practice of Geologists

Environmental Education Conference

The 1994 Minnesota Environmental Education Conference **Beyond Stereotypes: Redefining Environmental Education** will be held Friday, November 18 through Saturday, November 19, 1994 at the Park Inn in Alexandria.

Environmental educators are defined as people who are interested in communicating with others, in their professional and personal lives, the importance of environmental literacy. These communicators are not only teachers and higher education faculty, but also policy makers and staff, people interested in consumer issues, farmers, foresters, and naturalists, among others.

Conference participants will explore needs and set priorities for communicating about environmental topics to their peers, clients and students, share their own successes and interests, plan new programs, deal with controversial issues, and suggest solutions to problems of communication not yet solved.

For information about the program, call the Minnesota Environmental Education Advisory Board at (612)297-2228.

New USGS Publications

Two new United States Geological Survey publications have been released this spring with a focus on Minnesota hydrology:

Stoner, J. D., Lorenz, D. L., Wiche, G. J., and Goldstein, R. M., 1993, *Red River of the North Basin, Minnesota, North Dakota, and South Dakota*: American Water Resources Association Monograph Series No. 19 and Water Resources Bulletin, V. 29, No. 4, pp. 575-615.

Stark, J. R., Armstrong, D. S., and Zwilling, D. R., 1994, *Stream-aquifer interactions in the Straight River area, Becker and Hubbard Counties, Minnesota*: U. S. Geological Survey Water-Resources Investigations Report 94-4009.

1994 MGWA/AIPG Fall Field Trip

The Minnesota Ground Water Association (MGWA) and the Minnesota Section of the American Institute of Professional Geologists (AIPG) are planning their annual fall field trip for Stearns County. The dates are September 16-17, 1994. The format will be similar to previous years with a half-day seminar followed by a dinner on the 16th continuing with a full-day field trip on the 17th.

The Friday seminar will be held at the Blue Heron Conference Center in St. Cloud, which is adjacent to the Americana-Best Western, 510 South Hwy 10, St. Cloud, MN 56304; (612)252-7100. Twenty-five rooms are on hold through August 16th. A single will be \$54.95 + tax and a double will be \$61.95 + tax.

The program is currently being developed; watch for further details this summer.

Ground Water Guide Published

The Wisconsin Water Well Association and the Wisconsin Department of Natural Resources have published "Ground Water Protection - A Learning Experience" by Ed Huntoon. The technical guide includes information applicable far beyond Wisconsin's borders. The guide lists Maximum Contaminant Levels (MCLs) and describes the sources, health effects, and common treatment methods for pesticides and other substances regulated under the Safe Drinking Water Act. It lists common drinking water problems, causes, and treatment options. In a condensed article, the guide discusses three common water treatment methods: reverse osmosis, shock chlorination, and distillation. Diagrams include EPA's ground water protection strategy and the many environmental programs relevant to state ground water protection efforts. A list of more than two dozen national environmental hotlines is also included.

Copies may be obtained from the Wisconsin Water Well Association, c/o Edwin Huntoon, E2223 King Rd., Waupaca, WI 54981; (715) 258-3640.

— Stuart Cohen, *Ground Water Monitoring & Remediation*, Spring 1994

Editor's Note:

Two other interesting guides available from the Wisconsin Water Well Association are: *The 1994 Continuing Education Program* (includes everything from water treatment options to a discussion of the design of Roman baths) and the *Driller's Data handbook* by Edwin Huntoon (comprising a "kitchen-sink" collection of anything that might be handy for a driller, such as pipe volumes, the heat of hydration of cement, and use of a Marsh Funnel.)

Publication Covers Ground Water Monitoring, Investigations and Modeling

Hydrogeologic Investigations and Monitoring; Groundwater Modeling, edited by Yoram Eckstein, Kent State University, and Alexander Zaporozec, University of Wisconsin, offers up-to-date information on site characterization and assessment, modeling ground water dynamics, and contaminant transport. Published by the Water Environment Federation, it contains papers presented by experts in the plenary, technical and poster sessions of the Second United States of America/Commonwealth of Independent States (formerly the U.S.S.R.) Joint Conference on Environmental Hydrology and Hydrogeology, organized by the American Institute of Hydrology, and held in Russia.

Cost of this publication is \$22 for Water Environment Federation members and \$40 for nonmembers, plus postage and handling. To order, use reference number POO94PL and call toll-free (800) 666-0206.

— *Ground Water Monitoring & Remediation*, Spring 1994

Douglas County Ground Water Festival

About 650 fourth graders in Douglas County spent Tuesday, May 3, being part of a historic first event: the Kids Ground Water Festival in Douglas County.

Students spent the day traveling in groups of six to the 26 learning stations. Stations included the "giant bubble station", at which students stood in a pool of liquid and used a hula hoop to form a giant bubble around themselves; a ground water model station, at which students studied a cross-section of the ground to observe the movement of ground water; and a competitive "Water Bowl": based on the game Pictionary. In addition, all the students attended a presentation on meteorology from KSTP Meteorologist Dave Dahl.

The idea for the festival began with Miltona parent Gloria Weisel, who read about a similar event in Nebraska (begun by The Groundwater Foundation) and contacted the Douglas SWCD, the WesMin Resource Conservation and Development Area, and the University of Minnesota Extension Office to drum up support.

The event was held in the community center at the Douglas County Fairgrounds and a number of local businesses, service clubs, sporting organizations and others sponsored the event by contributing money or services.

Fall Lecture

New Paradigms of Global Interdependence in Hydrology

Andras Szollosi-Nagy, Director of the Division of Water Sciences for the International Hydrologic Program of UNESCO (Paris, France) will speak on November 10 on "New Paradigms of Global Interdependence in Hydrology". Mark your calendars -- details on his talk will be published in the next newsletter.

St. Cloud Students Head for Death Valley

On behalf of the department of Earth Science, I would like to thank you for the \$300 to help defray the expenses of this year's annual spring break field trip. With the MGWA's help, we completed a trip to the Death Valley, California area. Our trip included a visit to the Yucca Mountain site in Nevada where we had the opportunity to examine the Department of Energy's research on the Nuclear Waste Repository which may be located there.

Most of our time was spent examining the geology of the Death Valley area. This included a day examining the salt flats in the park, another day looking at the folding and faulting in the area, some time examining the volcanic rocks, and a day during which we drove around the park looking at the larger scale structural features and the geomorphology.

Our group consisted of 37 people which was the largest group we have had for many years. Texas Springs campground was our home in the park for 6 days. We concluded our trip with an overnight stay in Las Vegas before the flight back home to Minneapolis.

— Garry Anderson, St. Cloud State University



St. Cloud State students at Death Valley

Groundwater University

The Groundwater Foundation, Lincoln, Nebraska, has started a new non-academic, experience-based ground water learning program for junior high and high school students. Groundwater University is free for students and builds on the enthusiasm generated by the annual Nebraska Children's Groundwater Festival. (Minnesota has just held its first such festival this spring; see the related article on this page.)

Students will work with a groundwater professional who will be their mentor. Following an orientation, students will shadow their mentor. With the help of the mentor, the student will choose a ground water project of personal interest, develop a study plan, and conduct the project.

For more information about the Groundwater University program, call Amy Killham at The Groundwater Foundation: 1(800)858-4844.

New Educational Materials

Groundwater Education Strategies

Precious GEMs. Groundwater Education Strategies That Work, is a new book from the W.K. Kellogg Foundation that covers lessons learned during dozens of diverse ground water education and protection projects that the Kellogg Foundation funded in the "Groundwater Education In Michigan (GEM) program. Topics covered in the book include: "Excuse Me Sir, That's My Aquifer": Generating Local Ownership and Action, Hands Across the Water: Establishing Network of Support, Groundwater 101: Creating Education Programs That Work, Power to the People: Empowering Individuals and Creating Leaders, Presto! Chang-0! How to Keep Your Accomplishments from Disappearing. To request a copy, write the W.K. Kellogg Foundation, P.O. Box 5196, 180 South Union Street. Battle Creek, MI 49017-4918.

—*The Aquifer*, December, 1993

Great Lakes Ground Water Guidebook

A regional summary of educational materials and other resources was recently published in *A Guidebook to Groundwater: Resources & Education Opportunities in the Great*

Lakes Region. This guidebook was prepared by the Groundwater Education Task Force created by Great Lakes Commission with support by the W.K. Kellogg Foundation of Battle Creek Michigan. The guidebook includes the basics of ground water, factors affecting ground water quality, educational opportunities, community activities, and sources of help and information. The guidebook is presented in a question-and-answer format suitable for the general reader.

For more information contact the Great Lakes Commission, The Argus II Building, 400 Fourth Street, Ann Arbor, MI, 48103-4816, phone (313)665-9135.

Ground Water Guidebook Available

There are still copies of the Metropolitan Council report *Guidance for Local Ground Water Protection in Minnesota* available. MGWA printed special copies of the report so that it could be made available at the MGWA Fall Conference.

The remaining copies can be purchased for \$15 each, including postage (inside the U.S.). Requests can be sent to: MGWA, c/o WRI, 4779 126th Street North, White Bear Lake, MN 55110-5910. Checks should be made out to MGWA.

Wisconsin Geologist Registration Bill is Law

This past April, the Wisconsin Geologist Registration Bill was signed into law. The Wisconsin Governor, Tommy Thompson, must now appoint the members of the Geology Board of Regulation and Licensing. The Board will establish the administrative code in support of the statute, after which applications for registration can be accepted.

The basic requirements for Wisconsin Geologist Registration include:

- 1) 30 semester or 45 quarter hours in geology,
- 2) a bachelors degree,
- 3) 5 years of geological experience under a person who is qualified to have responsible charge of geologic work,
- 4) 5 letters of recommendation - 3 from persons who have personal knowledge of the applicant's geologic work, and
- 5) an exam.

Those meeting the basic registration requirements during the first year will not have to take the exam. After the first year, all must take the exam. The first year starts November 26, 1994.

For more information, contact Jim Senger, president of the Wisconsin Ground Water Association, STS Consultants, (414)468-1978.

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 1994. Annual dues are \$15 for professional members and \$10 for students. Additional donations toward the use of 100% recycled paper will be gratefully accepted.

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

.....

Name _____
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Home Address (optional) _____
City, State, Zip Code _____
Home Telephone Number _____
Which Address should we use for Directory Listing? _____
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Calendar

July 25 through August 19, 1994 *Fourth Annual Technology and Science Clinic*. For grades 7 through 9. A four-week program that gives junior high school students a rare opportunity to examine, "hands-on" some exciting new developments in technology and science. Modules include Architecture, Chemistry, Computer Aided Design & Drafting, Computer Technology, Manufacturing Technology, Electronics, Environment, and Printing/Graphics. FFI Michael O'Laughlin, University of St. Thomas/Dunwoody, (612)962-5765.

July 27-28, 1994. *Water Plan Coordinators Conference*, Holiday Inn, St. Cloud, MN. MN Board of Water and Soil Resources (BWSR) sponsors this conference to provide water plan coordinators from around the state the opportunity to share ideas and success stories. FFI Doug Thomas (612)297-5617.

August 2-5, 1994. *The Universities Council on Water Resources Annual Conference: Environmental Restoration*, Big Sky, MT. FFI Larry Mays, Dept. of Civil Engineering, Arizona State Univ., Tempe, AZ 85287, ph. (602)965-3589, fax (602)965-0557.

August 4-5, 1994. *Application of Geostatistics and Kriging in Ground Water*, in Golden, CO, FFI IGWMC.

August 10-12, 1994. *Groundwater Modeling Conference*, Fort Collins, CO, FFI IGWMC.

August 11-12, 1994. *Water Festival Workshop*. Lied Conference Center, Nebraska City, NE. FFI The Ground Water Foundation, PO Box 22558, Lincoln, NE 68542-2558, ph. (402)434-2740.

August 14-19, 1994. *IBM PC Applications in Ground Water Pollution and Hydrology*, Boston Park Plaza Hotel, Boston, MA, FFI NGWA.

August 17, 1994. *The Minnesota River: Our Past Actions, Present Uses, and Future Responsibilities*. FFI Minnesota Environmental Initiative, 2120 Rand Tower, 527 Marquette Ave. S, Minneapolis, MN 55402, ph. (612)334-3388.

August 17-19, 1994. *Bioremediation Engineering: Principles, Applications, and Case Studies*. FFI General Physics Corporation, Environmental Services, 6700 Alexander Bell Drive, Columbia, MD 21046-2100, ph. (800)395-4516.

September 12-15, 1994. *Analysis and Design of Aquifer Tests - Including Slug Tests and Fracture Flow*, Columbus, OH, FFI NGWA.

September 13-16, 1994. *Environmental Drilling, Well Installation and Sampling for Site Characterization and Monitoring*, Columbus, OH, by The Nielsen Environmental Field School. FFI 4686 State Route 605 S, Galena, OH, 43021-9652, ph. (614)965-5026.

September 16-17, 1994. *AIPG/MGWA Fall Field Trip to Stearns County*, at the Blue Heron Conference Center in St. Cloud, MN. Watch for details.

September 19-23, 1994. *Parameter Identification for MODFLOW*, in Golden, CO, FFI IGWMC.

September 26-28, 1994. *Application of Health Risk Assessment for Environmental Decision Making*, San Jose, CA, FFI NGWA.

September 26-29, 1994. *Geochemical Modeling of Ground Water*, San Jose, CA, FFI NGWA.

September 26-30, 1994. *Environmental Sampling and Field Sample Screening for Site Characterization and Remediation*, Columbus, OH, by The Nielsen Environmental Field School. FFI 4686 State Route 605 S, Galena, OH, 43021-9652, ph. (614)965-5026.

October 6, 1994. *Assessment, Control and Remediation of LNAPL Contaminated Sites*, Quality Hotel, Rosemont IL (near Chicago). FFI Environmental Systems & Technologies Inc, 2608 Sheffield Dr, Blacksburg, VA 24060-8270.

October 11-13, 1994. *1994 AIPG Annual Meeting*. Flagstaff, Arizona. FFI Mark Shellhorn 5080 N 40th St. Phoenix AZ 85018, ph. (602)840-3333.

October 18-22, 1994. *Principles and Application of MODFLOW and Accompanying Models*, in Golden, CO, FFI IGWMC.

October 24-26, 1994. *Principles of Ground Water Hydrology*, in Tuscon AZ, FFI NGWA.

October 24-27, 1994. *Introduction to Ground Water Geochemistry*, in Tuscon AZ, FFI NGWA.

October 25-26, 1994. *27th Annual Water Resources Conference*, University of Minnesota, St. Paul Campus. FFI Bev Ringsak, Professional Development and Conference Services, University of Minnesota, 206 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, MN 55455-0139, ph. (612)625-6689, fax (612)626-1632.

November 2-4, 1994. *Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Protection, Detection, and Remediation*, Houston, TX, FFI NGWA.

November 16-18, 1994. *Fifth International Conference Envirossoft '94, Development and Application of Computer Techniques to Environmental Studies*, San Francisco, CA. FFI Sue Owen, Wessex Institute of Technology, Ashurst Lodge, Ashurst Southampton, SO4 2AA, UK.

January 8-13, 1995. *IBM PC Applications in Ground Water Pollution and Hydrology*, Orlando Marriott, Orlando, FL, FFI NGWA.

More details available from:

AWRA, American Water Resources Association, 950 Herndon Parkway, Suite 300, Herndon, Virginia 22070, Bethesda, MD, 20814. (301)493-8600, fax (301)483-5844.

NGWA, The National Ground Water Association and the Association for Ground Water Scientists and Engineers, 6375 Riverside Drive, Dublin, OH 43017 (614)761-1711.

IGWMC, Institute for Ground Water Research and Education, Colorado School of Mines, Golden, Colorado 80401-1887 (303)273-3103, fax (303)273-3278.

Ground Water Guidebook Available

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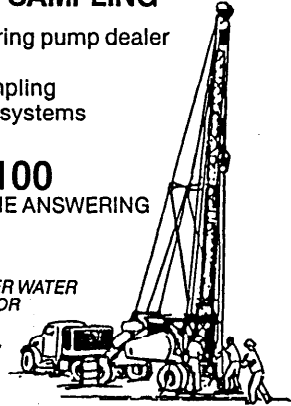
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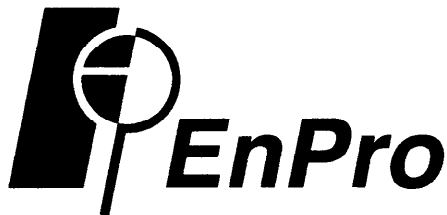
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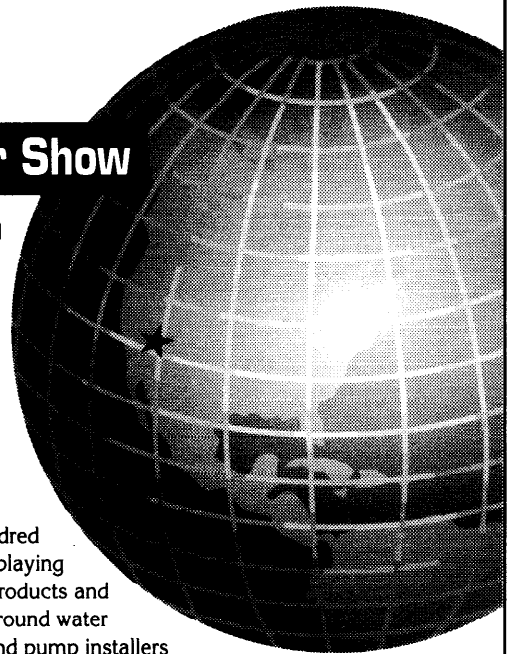
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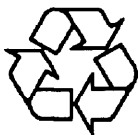
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