



# THE MAINE GEOLOGIST

THE NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

MARCH

1987

VOL. 13 NO. 2

## Society News:

### SPRING MEETING

Bates College

March 27 - 1 PM

Student Presentations

Business Meeting

Evening Program

### PRESIDENTS MESSAGE:

I would like to thank all of those students and faculty at the University of Maine who took the time to present the results of their ongoing research during the October meeting. Contributors to the fall meeting included Hal Borns, Julie Brownlee, Jim DeYoreo, Bill Duffy, Brad Hall, Brad Hay, Steve Kahl, Steve Nodvin, Maul Pelto, Detmar Schnitker, John Scofield, Becky Smith and Andy Walsh. Ed Decker was the evening speaker. It appears that there is tremendous vitality and momentum within the geosciences there, and that solid efforts and advances are being made which reflect well on the department and the university. For those of you that may not be aware the Department of Geosciences is planning to implement a Doctoral program. I wish them well in their efforts.

The winter meeting was likewise a success. Carol White was responsible for most of the organization. Thanks for the fine job Carol. The speakers, who included Peter Garrett, Bill Holland, Marcel Moreau, John Tewhey, Andy Tolman, Carol White with John Rand, and John Williams, all did fine jobs in presenting to the Society various aspects of their studies relating to ground water contamination.

Attendance at both meetings was good. My head count was 58 for the Orono meeting and 69 for the Bowdoin meeting.

As a news item there are several bills that may be placed before the legislature this spring which, if submitted, most probably will have an impact on some of us. These bills would deal with groundwater; specifically sand and gravel and bedrock aquifers, groundwater liability, water well information, generation of hydrologic surface water data, coastal mapping and nuclear waste. At this writing it is not clear as to which, if any or all, of these will make it to the legislator. Those of you that are interested should contact your local legislature for copies of any of these pending bills.

### SECRETARY'S REPORT:

#### GSM Winter Meeting -- Bowdoin College

The Winter meeting was held on February 13, 1987 at Bowdoin College in Brunswick. The afternoon featured six talks on the relationship of geology to ground water studies, presented by John Tewhey, Carol White, Andy Tolman, Bill Holland, Peter Garrett, and John Williams. Marcel Moreau presented the evening talk (which was held in the afternoon). Marcel spoke on the psychology of underground tank management in Europe, and somehow tied this in to European architectural design.

The business meeting was opened at 4:25 P.M. President Steve noted that 50-60 people attended the Fall meeting in Orono. The secretary was not one of those people, so there was no secretary's report. Bob Gerber had fled to Denver to avoid presenting a treasurer's report, but Andy Tolman assured us that there was money left.

Ed Bradley voiced a concern that certified Maine Geologists do not necessarily know anything about hydrogeology, and competent hydrogeologists are not necessarily Certified Maine Geologists. Ed feels that certification by NWWA or the American Institute of Hydrology may be more appropriate for ground water people. Sue Corderman reported that geologists in Massachusetts felt that the NWWA certification program was a thinly disguised profit making operation.

Steve Pollock announced that the Spring Meeting will be held March 27 at Bates. Nominations for officers will be taken at this meeting. Steve does not want to retain his position for a third term, so a new president is needed. A rumor that Bob wanted out of the treasury was circulated; the need for a new secretary was not discussed but is quite obvious. A nominating committee of John Tewhey, Marc Loiselle, and Carolyn Lepage was formed.

Walter Anderson announced a schedule for speakers at UMO this spring. This schedule is shown elsewhere in this newsletter.

There being no further business, the meeting was adjourned at 4:45 P.M.

Submitted by John Williams, Secretary

Note the date on the mailing address and send in your dues if you have not done so already.

Correction: A mistake was made in the last GSM Newsletter in the Treasurer's Report. The check book balance on July 31, 1986 should read \$1345.74.

## Notices:

### NEGSA '88 SYMPOSIA

Plans are underway to organize a number of symposia to be convened at the 1988 Geological Society of America's Northeastern Section (NEGSA) Annual Meeting in Portland. At press time, these sessions and the conveners included the following:

Emergent and Submarine Glaciomarine Sediments in the Gulf of Maine Region-- Joe Kelley and Bob Oldale

Human Occupation of Late-Pleistocene Ice-Marginal Environments--Hal Borns

Contaminant Transport in Glaciated Terrains in Northeastern North America-- Andy Tolman and John Williams

The Society of Economic Paleontologists and Mineralogist, Paleontology Society, and National Association of Geology Teachers are also expected to sponsor symposia. If you are interested in organizing a symposium or would like additional information, contact NEGSA '88 Symposia Chair Carolyn Lepage at the following: Bureau of Oil and Hazardous Materials Control, Department of Environmental Protection, State House Station #17, Augusta, ME 04333, telephone 207-289-2801.

### FOCUS On Eastern Regional Ground Water Issues: A Conference

July 14-16, 1987 \* Radisson Hotel  
Burlington, Vermont

Co-sponsored by: The Association of Ground Water Scientists and Engineers (division of NWWA); Maine Geological Survey, Department of Conservation; Maine Department of Environmental Protection; Massachusetts Department of Environmental Quality Engineering; Vermont Department of Water Resources and Environmental Engineering; New England Interstate Water Pollution Control Commission; Petroleum Association of Conservation of the Canadian Environment; Association Petroliere pour la Conservation de l'Environment Canadian; and Environment Canada

Contact: Linda Aller  
Director of Research  
National Water Well Association  
6375 Riverside Drive  
Dublin, OH 43017

## Winter Meeting Abstracts:

### BEDROCK AQUIFER CHARACTERIZATION PROGRAM

John S. Williams  
Maine Geological Survey

Although sand and gravel deposits provide the most abundant and easily obtainable ground water for public water supplies, 80

percent of Maine's rural population utilizes fractured bedrock for their water supply. In addition, many municipalities, and industries, particularly in coastal areas, use bedrock wells for part or all of their water supply.

The vulnerability to ground water contamination of bedrock aquifers has been demonstrated by the extensive bedrock well contamination which has occurred from leaking gasoline storage tanks, from sand-salt piles, and hazardous waste disposal sites across the state. Replacing these water supplies has been an expensive and often futile undertaking.

Protecting valuable bedrock aquifer areas is difficult because our information base on this resource is very limited. There have been several site specific studies of bedrock aquifers in Maine and preliminary compilations of bedrock well data in some counties, but no statewide assessment of the quantity or quality of water available in fractured rock aquifers. This lack of compiled information became readily apparent during the debate over the siting a high level radioactive waste disposal facility in Maine.

To address these concerns, the Bedrock Aquifer Characterization Program was initiated in 1985. During this program all known information on bedrock well yield and characteristics in an area will be compiled; a lineament analysis of aerial photography will be performed to identify potential areas of intensely fractured bedrock; surficial and bedrock geology will be mapped; and brittle fracture analysis of selected areas will be done, noting major fault/fracture locations. All of this information will be entered into the Geographic Information System computer data base. Information on well yields (provided through the Voluntary Well Reporting Program) will be correlated with rock type, surficial geology, fracture traces, overburden thickness, and other factors. Those features found to have positive correlations with yield will be determined. In areas with these features, seismic, resistivity, gravity, and terrain conductivity surveys will be run.

If the geophysical information indicates highly fractured rock (irregular bedrock surface, high conductivity, low gravity) the area will be considered a potential high yield zone. To the extent funding allows, wells will be installed and tested to determine yield and aquifer properties, and to confirm geophysical methods.

In addition to determining the quantity of ground water available, information on ground water quality in bedrock aquifers will be obtained. This information will be used to establish baseline water quality conditions, to test for salt-water intrusion in coastal areas, and to monitor water quality in areas near potential contamination sources.

Characterizing fractured bedrock aquifers throughout the state will take at least 10 years. The project was begun in 1985 in northern Aroostook County. If continued funding is obtained, field work this summer will continue in northern Aroostook County, and will be initiated in the Bangor-Ellsworth area.



BEDROCK VS SAND AND GRAVEL AQUIFERS/  
GASOLINE CONTAMINATION AND  
VULNERABILITY INDICES

By: Peter Garret, Bureau of Water Quality Control, Maine Department of Environmental Protection

The fractured bedrock aquifer is more vulnerable to contamination than any other in Maine. Many of us have suspected it to be so, but here is the evidence:

When gasoline contamination of groundwater is discovered, it usually takes only a month or two from first detection to tank removal and installation of a product recovery system. Recovery is always minimal from bedrock aquifers. It ranges from a maximum of 125 gallons (at Friendship), down to no recovery at all because there is no free product even in the tank excavation. In fact DEP spill response staff rarely install recovery wells in bedrock aquifers.

In contrast, recovery of free product from gasoline spills in sand and gravel aquifers is usually in the thousands of gallons.

This striking difference in aquifer behavior is not due to the incomprehensible nature of the bedrock aquifer. Rather it is due to differences in effective porosity between sand and gravel (25%) and bedrock (.001 - 1%) aquifers. This difference can increase the seepage velocity in the bedrock aquifer. It also results in a greatly reduced storage capacity of the bedrock aquifer, for gasoline product as well as for water.

The net result is that very little gasoline can leak into the bedrock without it being detected in nearby wells.

DRASTIC, the leading index of vulnerability, was developed as a consensus of expert opinion regarding weightings and scores given to different parts of recharge and transport paths of possible contaminants. DRASTIC scores common bedrock situations at about 110-120, and sand and gravel at about 180-200, on a relative scale. I suggest that the scores should be reversed.

The current regulatory direction is to securely contain almost all threats to groundwater. So the remaining threats involve mostly small accidental spills onto or into soils as well as leachate from landfills and septic systems. Perhaps our approach to groundwater planning should be based on the capacity of soils to retain those small spills without affecting groundwater quality, rather than on all the factors evaluated by DRASTIC.

EUROPEAN PERSPECTIVES ON PREVENTION OF LEAKS  
FROM UNDERGROUND OIL STORAGE SYSTEMS

By: Marcell Moreau, Maine Department of Environmental Protection, State House Station #17, Augusta, Maine 04333

There is no single "European" approach to underground storage tank management because environmental settings differ, and perhaps even more importantly, people differ. There are, however, some common threads among European tank management strategies which are

worth noting: 1) All storage facilities must meet the same requirements, regardless of ownership or use. 2) Keeping product inventory is seen as a good business practice, but not a viable leak detection method. 3) Bituminous coatings for steel tanks are common, and cathodic protection is not routinely required. 4) Outside-the-tank leak detection technology is virtually unknown. 5) Fiberglass tanks are not commonly used at marketing and distribution facilities. 6) Suction pumping systems at retail installations are preferred because they can be made intrinsically safe against environmental damage. 7) All underground tanks have manholes and all piping enters through the manhole lid, allowing easy inspection of tank/piping connections. 8) Overfill protection measure of some type are common. Of the countries visited, West Germany has the best developed and most aggressive underground tank regulatory program and appears to have the problems largely under control. Key elements of the German strategy include: 1) Mandatory double wall tank construction with a leak detection fluid in the interstitial space. 2) Overfill controls which cut off the product flow when the tank is 95% full. 3) Double walled piping for pressurized pumping systems and single wall piping with specific check valve requirements for suction pumping systems. 4) Certification of storage systems installers. There are time-tested technological solutions to the underground storage tank problem. Can they be implemented in this country?



University of Maine  
Guest Speakers  
Geological Sciences  
Boardman Hall - 3:00P.M.  
Wednesday, April 22+

"Southeastern Maine: Where does it fit in the Appalachians?"

Dr. Alan Ludman  
Queens College CUNY

Distinguished Lecturers in Marine Science  
Seminar Series  
Center for Marine Studies  
University of Maine

Lectures at 3:30 p.m.  
Room 15, Coburn Hall, Orono, Maine.

13 April 87

"Animal, sediments, and fluid flow"

Dr. P. Jumars  
School of Oceanography  
University of Washington  
Seattle, Washington

4 May 87

"Seaweed life forms, growth rate, and the variable environment"

Dr. J. Ramus  
Department of Botany  
Duke University Marine Laboratory  
Beaufort, North Carolina

**MEMBERSHIP DUES STATEMENT**

**THE GEOLOGICAL SOCIETY OF MAINE, INC.** is a non-profit Maine corporation established as an educational Society to advance the professional improvement of its members; to inform its members and others of current and planned geological programs in Maine; to encourage continuing social contact and dialogue among geologists working in Maine; and to further public awareness and understanding of the geology of the State of Maine, and of the modern geological processes which affect the Maine landscape and the human environment.

The Society holds three meetings each year, in the late fall, early spring and (with the Annual Meeting and sometimes field trips) in mid-summer. A newsletter, **THE MAINE GEOLOGIST**, is published for all members four times a year (more or less), approximately on a quarterly basis starting in September. The Society year runs from August 1st to July 31st. Annual dues and gift contributions to the Society are tax deductible. There are three classes of annual memberships:

- \$7 REGULAR MEMBER - Graduate geologists, or equivalent, with 1 year of practice in geology, or with an advanced academic degree in geology
- \$6 ASSOCIATE MEMBER - Any person or organization desirous of association with the Society
- \$4 STUDENT MEMBER - Persons currently enrolled as students in college who are interested in geology
- \$2 APPLICATION FEE - A one-time fee to all new members, payable when applying for membership

**ANNUAL RENEWAL or APPLICATION FOR MEMBERSHIP - THE GEOLOGICAL SOCIETY OF MAINE**

NAME _____ (Please print or type)	Regular Member \$7 per year \$ _____
ADDRESS _____ (permanent Mailing Address)	Associate Member \$6 per year \$ _____
_____	Student Member \$4 per year \$ _____
_____	Application Fee \$2 One-time \$ _____
_____	<b>TOTAL ENCLOSED :</b> \$ _____

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P. O. Box 270  
South Freeport, Maine 04078

**THE GEOLOGICAL SOCIETY OF MAINE, INC.**

**86/87 SOCIETY YEAR STARTED - AUGUST 1st - PLEASE SEND IN YOUR DUES**

THE GEOLOGICAL SOCIETY OF MAINE  
C/O Arthur M. Hussey, Dept. of  
Geology, Bowdoin College,  
Brunswick, Maine 04011

THE MAINE GEOLOGIST is published four times a year, more-or-less, in early Fall, late Fall, late Winter, and maybe June or July, for members of the Geological Society of Maine, a non-profit educational Maine corporation interested in all aspects of the geology of the State of Maine.

Correspondence about membership in the Society should be mailed to Robert G. Gerber, P.O. Box 270, South Freeport, 04078. Items for inclusion in the newsletter may be directed to Robert A. Johnston, Maine Geological Survey, Department of Conservation, Station #22, Augusta, ME 04333.

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