Dear Colleagues:

As I reflect back over the past 25 or so years and all of the changes that have taken place in the field of hydrogeology, I am amazed at the things we have accomplished, the new roads that have been blazed, graded, or paved, and the progress that we have achieved. These advances were exemplified at the annual meeting in San Antonio where more than 80 hydrogeologic reports were presented ...a far cry from the dozen or so that was typical in the early 1960's. I hope that those of you who were not with us in San Antonio this year will be with us in Phoenix next year.

I also recall GSA meetings from past years when the Hydrogeology Division sessions were attended by about 20 to 40 individuals and everyone knew everyone else and what they were doing. It was a pretty small group then, mostly geologists with a few engineers and perhaps even a chemist or two. In October 1986, the Division consisted of 1585 members, up 242 from the previous year. We now comprise the second largest division in the Association. I see no reason why we can not become the largest group within the next five years and I challenge each of you to enlist at least one new member during 1987.

The growth of our division and the field of hydrogeology in general, however, has not been without some expense. We now need to know more about supplementary topics than at any other time. We are being challenged every day to learn new things, to increase our understanding, and to provide a service. The day of specialization is gone; we need to return to the fundamentals of hydrogeology, to think, to try, and to question what in the past we always considered to be elementary. We commonly use, for example, the term "water table"; just what does this mean, particularly in the context of fine-grained sediments and Superfund or RCRA sites? What do we really know about the hydrogeology of silt and clay, of the mechanics of natural recharge, of flow through fractures, and of mass transport—not from a gross perspective, but rather in detail?

The division has a number of committees, their purpose being to help carry out the goals, mission, and duties of the membership. In this regard, it has always been my feeling that the committees are merely small, manageable groups that should respond to the desires of the entire division. For this reason, I encourage each of you to provide input to the committees, particularly the O.E. Meinzer Award and the Distinguished Service Awards. The Chairperson for these committees for 1987 are Mary Jo Baedecker (USGS, 432 National Center, Reston, VA 22092; 703-860-6083) and Joe Rosenshein (USGS, 1950 Avenue A, Campus West, University of Kansas, Lawrence, KS 66045; 913-864-4321), respectively.

Wayne A. Pettyjohn, Chairman
Hydrogeology Division
The 1986 business meeting of the Hydrogeology Division of the Geological Society of America was called to order at the conclusion of the luncheon by the Chairman, Bill Back. The meeting was held in the Regency East Room of the Hyatt Regency Hotel, San Antonio, Texas, on Tuesday, November 11, 1986.

Back introduced the members and guests seated at the head table: Phyllis Carman, Secretary-Treasurer; Darryll Pederson, Secretary-Treasurer-elect; Lenny Konikow, 1986 Distinguished Birdsall Lecturer; Phil Lamoreaux, Recipient of Distinguished Service in Hydrogeology; Mrs. Lamoreaux; Travis Hughes, Citationist for Distinguished Service Award to Lamoreaux; Wayne Pettyjohn, First Vice-Chairman and Chairman-elect; Mel Schroeder, Liaison to Council; T.N. Narasimhan, Recipient of O.E. Meinzer Award; Mrs. Narasimhan; and Shlomo Neuman, 1987 Distinguished Birdsall Lecturer and Citationist for Meinzer Award to Narasimhan.

The first item on the agenda was the presentation of the GSA and Hydrogeology Division awards. Back first presented a Certificate of Appreciation to Leonard Konikow, 1986 Distinguished Birdsall Lecturer. Citationist, Travis Hughes, presented an Award for Distinguished Service in Hydrogeology to Phil Lamoreaux; Phyllis Carman presented the citation for Ralph Heath, Distinguished Service Recipient; in Ralph's absence, Wayne Pettyjohn accepted the award. Bruce Hanshaw was citationist for Distinguished Service Award to Harry LeGrand. In Harry's absence, Bill Back accepted the award for him. Both Harry and Ralph were unable to attend the meeting because of illness.

The O.E. Meinzer Award was presented to T.N. Narasimhan. The Meinzer Bowl and Citation for the award were presented by Shlomo Neuman.

After a short break the business meeting was resumed with the Secretary-Treasurer's report. A motion to accept the minutes of the 1985 meeting as printed in the winter newsletter was made by Grover Earich and seconded by Bruce Hanshaw. The motion was carried without discussion.

The Treasurer's report for the current year, through September 30, 1986, was a Division Fund Balance of $8,830.07 and Birdsall Appropriated Fund balance of $10,527.27. A letter to the GSA Controller will be needed to be sure that $2.00 of each member's dues is set aside for the Birdsall Lecturer as voted upon last year and subsequently approved by Council.

Membership in the division is 1585, an increase of approximately 240 within the last year, which makes the Hydrogeology Division the second largest division of GSA.

Chairman Back then asked that the members present stand for a moment of silence in memory of those affiliates of the division who died during the past year. They were:

Donald W. Ash
Hank B. Beck
Martin J. Buerger
Robert M. Lindvall
I. Wendell Marine
Robert S. Moehlman
Howard S. Stafford

The Secretary then announced the results of the election of officers for 1987. They are:

Wayne Pettyjohn, Chairman
John Sharp, First Vice-Chairman
Robert Farvolden, Second Vice-Chairman
Darryll Pederson, Secretary-Treasurer (two-year term)

Bob Farvolden relayed the favorable comments from the GSA Administration on the many activities within GSA conducted by the Hydrogeology Division and division members.

Jack Sharp, 1986 division program co-chair with Pat Domenico, was asked to report on the meeting. He said that there had been good cooperation from the members and that there had been so many abstracts received that the rejection rate was 40%. Division activities included a two-day short course on Contaminant Hydrogeology led by Frank Schwartz and Leslie Smith; a pre-meeting field trip led by Weldon Hammond; a post-meeting trip by Patrick Abbott and Charles Woodruff; two symposia, "Hydrogeology of Sedimentary Basins" convened by Kreitler and Sharp; "Scientific Advances in Geology and Hydrology from Studies of Contaminant Plumes" led by Cartwright and Stephenson; and a co-sponsored symposium with NAGT, "Recent Advances in Hydrogeology: Implications for Instruction" by Pipkin and Davis; and one poster session.

Frank Schwartz reported on the two-day short course conducted by Leslie Smith and him. The course, "Contaminant Hydrogeology" was very well received by participants and lots of positive feedback was given to the instructors on the course and its usefulness to the meeting.

Larry Doyle, President of International Association of Hydrogeologists (IAH), announced that they would be having a meeting later in the day. John Moore, Vice President of IAH, also spoke and encouraged Division members to attend and to join IAH.

Jack Hess, Division Program Chairman for the 1987 meeting in Phoenix announced that they may have some "theme" sessions in addition to a symposium. A short course is being discussed as well as one field trip by Holzer and Lluria.

Jack Sharp, who will be Division Chairman for the 1988 meeting in Denver, asked the members to begin submitting ideas for the program. The 1988 meeting will also be the GSA Centennial year. Special field trips are being organized by Greg Holden.

The 1989 meeting will be held in St. Louis and Bob Farvolden will be Division Chairman then.

Frank Schwartz, Chairman of the Birdsall Lecture Committee, was asked to report on this year's activities. He related that there are many more requests than ability to fulfill. Back solicited the group for ideas to fulfill the commitments. Some suggested having two lecturers; others thought that to be "in demand" was good. No decision was made. Schwartz announced that Shlomo Neuman is this year's lecturer.

Bruce Hanshaw, Program Chairman for the 28th Session of the International Geological Congress to be held in Washington, D.C., in 1989, announced some of the changes in the program. There will be 165 interdisciplinary symposia, all topic oriented. There will be poster sessions, fifty short courses and workshops, and 150 field trips each approximately eight days long. This is the oldest continuing Congress and has not met in the United States since 1936. There
will be a "Geo-host" program to aid foreign country participants.

Joe Rosenshein announced that Hydrogeology Volume for DNAG is now 85 percent complete. It will be ready to send to Boulder Headquarters by mid-December. Publication is expected next spring.

Keros Cartwright, Chairman of the Hydrostratigraphic Nomenclature Committee, announced that their work is now a Commission Document. It has been sent to AAPG to be published as a "Note." It will be open for discussion for one year; therefore, the earliest time for passage of the document is 1989. The Division Committee will present the paper for publication in a hydrogeological journal as well.

Back asked for Section Representatives to relate information on their programs. Lon Neudisili of the North-Central Section announced that they had a very successful symposium on hydrogeology this year and will be presenting another next spring. Joe Yelderman of the South-Central Section said that their deadline for abstracts was next week for a hydrogeology symposium to be March 30-31, 1987. Prim Saint gave a report on the Cordilleran Section. No other sections reported.

Noel Krothe, Chairman of the Ad Hoc Committee on History of Hydrogeology, has his committee organized. The members are: Darrell Leap, Al Freeze, Jack Sharp, and Bill Back. The goal is to have a symposium for the 1988 Centennial Meeting in Denver. They are in the process of video-taping interviews of prominent hydrogeologists. Narasimhan suggested that they should obtain the papers of Theis, Jacob, Hantush, and others and provide an archive of their papers and letters. Freeze said it would require an interagency committee to organize and then one agency could act as the repository.

Publications Committee Chairman, Steve Wheatcraft, announced that the committee by-laws had been prepared and are ready for submittal to the division and council. After brief discussion, George Davis made a motion that the by-laws be accepted based upon review and approval by the Division Management Board. Larry Doyle seconded the motion and it passed. Copies of the by-laws will be sent to members of the Management Board for review.

Mel Schroeder, Division Liaison to Council, related the change in the council meetings. They are now open to members providing a much more democratic atmosphere. He also said that the profits from the Short Course conducted by Schwartz and Smith would go to GSA and not the division since it had not been contracted as a co-sponsored event with an agreement for profit dividing—something to be aware of for future meetings.

Back reported on the response from the GSA Controller about the division having a Memorial Fund for any contributions that are sent in. After brief discussion, Grover Emrich made a motion to establish a Hydrogeology Division Memorial Fund with no restrictions for use. The motion was seconded by Warren Wood and passed.

Dave Stephenson announced a Penrose Conference of Division interest to be held July 12-17, 1987. It will be on "Geological Decisions for the 21st Century." Conveners, besides Dave, are Charles Mankin, Allen Agnew, and Dan Miller. It will be about geo-politics and involvement in geological legislative decisions.

Back then brought to the attention of the members that the National Science Foundation does not have a hydrogeological group to provide reviews of proposals submitted. They are reviewed by Engineering or Surface Processes. After discussions, Jack Sharp accepted the responsibility to draft a letter from the division and GSA to present our viewpoint on the matter to NSF.

With no further business, Bill Back then turned the chairmanship of the division over to Wayne Pettyjohn. Wayne reiterated that the division is the second largest within GSA and has the potential for increase in size and contribution to GSA and to become number one by next year. His hope is that it will.

Bill Back then made a motion to adjourn. It was seconded by Keros Cartwright. The motion passed and the 1986 Business Meeting of the Hydrogeology Division was adjourned.

### Treasurer's Report

As of September 30, 1986, the Division had a balance of $18,830.07 in the treasury.

| Division Fund Balance (December 31, 1985) | $5470.81 |
| Income | $6374.00 |
| Expenses | ($915.22) |
| Newsletter | ($2099.52) |
| J.M. Birdsall Fund | $10,000.00 |
| Fund Balance, December 31, 1986 | $527.27 |
| Earnings through September 30, 1986 | $8830.07 |
| TOTAL | $10,527.27 |
In recent years, there has been a great increase in the use of deterministic ground-water-flow and solute-transport models for analyzing ground-water systems and for predicting responses to changes in stress. This stems in part from the increased availability of well-documented models, computational resources (including personal computers), and short courses (which have also led to the creation of a fair number of "instant experts"). Many people who are using ground-water models or relying on their results are not fully aware of the assumptions that have been incorporated into them. There is a danger that some may believe that the accuracy of their prediction is somehow coincident with the numerical accuracy of the mathematical solution. This perception is obviously invalid; the numerical errors arising strictly from inaccuracies in the equation-solving algorithm are usually much smaller than the predictive errors produced by: (1) the theoretical misconceptions or oversimplifications incorporated in the model; (2) uncertainty and error in the specification of system properties, boundary conditions, and initial conditions; and (3) uncertainty in future stresses. This false sense of accuracy and unjustified confidence may arise from the quantitative nature of numerical simulation. The uninitiated may tend to confuse quantitativeness and precision with reliability and accuracy.

Complex and sophisticated ground-water simulation models are being increasingly used to support regulation, legislation, management, and adjudication of ground water. Because of this, I felt that it would be worthwhile to assess the accuracy of past model predictions. I examined about a half-dozen cases in which deterministic ground-water flow or solute-transport models had been used to make predictions sufficiently long ago so that adequate time had elapsed to allow a meaningful comparison of the predicted changes with the actual changes, and for which comprehensive model documentation and actual field data were available (not too many cases met these conditions). In general, the results of these postaudits did not yield a high correlation between observed and predicted changes. In one case, a 1-year period of detailed observation provided an inadequate basis to predict longer term (10-year) changes in ground-water salinity in an irrigated stream-aquifer system. In another example, it was shown that a 40-year calibration period, in itself, did not provide a reliable basis for predicting changes in ground-water levels for a 10-year period. Although these examples are neither exhaustive in scope nor firmly conclusive in implications, they at least call into question the credibility and validity of predictions of heads and contaminant transport in ground water for perhaps tens, hundreds, or thousands of years in areas where there may be no historical observations, as is required for nuclear-waste isolation.

Of course, it would be valuable to assess the causes of predictive errors. Unfortunately, in a postaudit we generally still face most of the same uncertainties in data at the end of the predictive period as at the start, except perhaps that the assumed future stresses become part of the historical record. Certainly much of the predictive error is attributable to errors in the assumed future stresses. However, a large component of the total error arises from an overly simplistic approximation of a complex three-dimensional heterogeneous world.

In the development of a ground-water model for a specific area and purpose, we must select an appropriate level of complexity (or, if you wish, simplicity). We are inclined to believe that finer resolution in a model will yield greater accuracy. However, we must also face the practical constraint that even when appropriate data are available, a finely discretized three-dimensional numerical model may still be too large or too expensive to run on a computer. On the other hand, analytical solutions (or models) are relatively simple, inexpensive, and give exact solutions to the governing equations. However, they require great simplifications of the properties, boundaries, and stresses of the system of interest. Some argue that because we cannot define all of the heterogeneities in the field, and because of the sometimes overwhelming mathematical complexity and high costs of some numerical models, we should rely more strongly on analytical solutions, particularly for transport problems. Although there is some value in this simpler analytical approach, especially from the perspective of a preliminary sensitivity analysis, it can also be viewed as obtaining a mathematically exact solution to the wrong problem. It reminds me of the old joke about the man who lost his keys in a dark alley one night and decided to search for them on a nearby street because the light was much better there. The selection of the appropriate type of model and appropriate level of complexity will remain subjective and dependent on the reader judgment and experience of the analysts, the objectives of the study, and level of prior information on the system of interest. The trade-off between accuracy and cost will always be a difficult one to resolve, but will always have to be made. In any case, managers and other users of model results must be made aware that these trade-offs and judgements have been made and may affect the reliability of the model.

The next major level of improvement in ground-water simulation models will not arise from improved numerical procedures; rather, a greater investment must be made in obtaining more accurate descriptions of aquifer properties and their variability. A higher priority must be given to calling upon hydrogeologists to provide better definitions of the geometry, boundary conditions, heterogeneities of the system being analyzed, and field data to calibrate and verify models. It is especially critical for transport models that variability in the permeability field be defined as completely as possible. To paraphrase a statement by Charlie Kreitler at the 1986 GSA Annual Meeting in San Antonio, on the whole we need more geology in hydrogeology.
SUGGESTIONS SOLICITED FOR 1988
CENTENNIAL MEETING IN DENVER

The Centennial Annual Meeting of the Geological Society of America will be held in the fall of 1988 in Denver, Colorado. Tom Winter, U.S. Geological Survey, will be the Hydrogeology Division program chairman for the meeting. We hope to present a program at least as successful as the one at the 1986 San Antonio meeting. We need ideas for symposia, general sessions, and particularly, field trips as soon as possible. The field trip deadline is fast approaching. Symposia proposals are due in the fall. Contact Jack Sharp (512-471-3317) or Tom (303-236-4987) if you have suggestions. We also hope to offer another short course since the first one (1986) was so successful. It would be appropriate for the Hydrogeology Division, GSA's second biggest and fastest growing division, to offer a super program at the Centennial Meeting.

PUBLISH IN THE GSA BULLETIN

Jack Sharp would like to encourage Hydrogeology Division authors to submit papers for publication to the Bulletin of the Geological Society of America. The journal is ideal for articles which provide geological insights or draw heavily on geological bases. One of Jack's goals as an associate editor is an increase in the number of hydrogeology papers published in the Bulletin. It's important to expose our scientific colleagues to some of the exciting areas of our own field of science. Hydrogeology has much to offer other areas of the geological sciences.

HISTORY OF HYDROGEOLOGY

A committee on the History of Hydrogeology has been formed by the Hydrogeology Division of GSA. The committee members are as follows:

Noel C. Krothe (chairman) Indiana University
Allan R. Freeze University of British Columbia
Darrell I. Leap Purdue University
John M. Sharp University of Texas
William Back USGS, Reston, VA

The committee is not finalized and anyone wishing to serve can contact Noel C. Krothe. The responsibilities of the committee are to generate an awareness of the importance of the history and heritage of hydrogeology. This will be achieved by organizing symposia, soliciting appropriate papers for publication, and accumulating archival material. We are planning a symposium for the Centennial celebration in 1988.

Among the archival material that we should begin collecting are video-taped interviews of the founders of hydrogeology who are still with us. John Bredehoeft has already completed a two-hour interview with C.V. Theis and we need to arrange interviews with others. The interviews take considerable thought and preparation and the committee will be willing to assist in such an effort.

If you have any other ideas concerning the role of the committee, please contact one of the committee members. Those of you who are interested in history should be thinking about appropriate papers to be presented in 1988 at the GSA meeting in Denver.

COURSE ON KARST

Western Kentucky University and Mammoth Cave National Park offer two one-week courses at Mammoth Cave National Park each summer. The courses may be taken for graduate or undergraduate credit or as workshops. The two courses are "Karst Hydrology," May 31-June 6, and "Karst Geology," June 14-20, 1987. For additional information, contact:

Nicholas C. Crawford, Ph.D.
Director, Center for Cave and Karst Studies
Western Kentucky University
Bowling Green, Kentucky 42101

21st IAH CONGRESS

October 10-15, 1988


INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS

The International Association of Hydrogeologists (IAH) is a scientific and educational nonprofit international organization established to exchange hydrogeologic information and to advance the science. IAH promotes cooperation between scientists who are working on hydrogeologic problems. It is affiliated with the International Union of Geological Sciences (IUGS). The IAH will accept for membership an individual engaged in hydrogeologic investigations, research, or management. Membership is granted on the basis of scientific qualifications, experience, and publications. Dues are $28. For additional information, contact:

E.S. Simpson, Secretary-Treasurer, IAH
Department of Hydrology and Water Resources
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