

The Engineering Geologist



THE
GEOLOGICAL SOCIETY
OF AMERICA

NEWSLETTER OF THE ENGINEERING GEOLOGY DIVISION OF THE GEOLOGICAL SOCIETY OF AMERICA

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October, 1987

CHAIRMAN'S MESSAGE ENGINEERING GEOLOGY DIVISION GEOLOGICAL SOCIETY OF AMERICA

The Division will be 40 years old at the 1987 Annual Meeting of the Society in Phoenix, Arizona; the Association of Engineering Geologists is celebrating their 30th Annual Meeting this year in Atlanta, Georgia; the International Association of Engineering Geologists is well established; and yet I find it interesting to learn that we do not "know" who we are. To ask an engineering geologist, "What is engineering geology?" generates the answer: (1) "Engineering geology is applied science" or (2) "Engineering geology is the application of geology to engineering." These definitions of engineering geology have created an identity problem for the profession, because they define engineering geology as a **practice** and not as **science**. If we are to improve our scientific recognition and stature and to advance engineering geology, we must first know "who we are."

From the position of the Engineering Geology Division of the Geological Society of America, we must establish that engineering geology is, in fact, **science**, and that this science is founded in the broader science of geology. Since engineering geology is science, then it is possible possible to carry out basic research not obviously or immediately applicable to engineering or to the public. This is critical because any advancement of the science of engineering geology must be made through basic research.

I propose that engineering geology is the study of the earth and its physical processes and the consequences of human interaction with these processes. This defines the science of engineering geology to include the study of the earth's impact on the works of Man and Man's influence on earth processes. The science is centered on the discovery and elucidation of the principles of earth science which can be used to predict conditions that affect the public's health, safety, and welfare or the feasibility and economy of engineered works. this definition requires that the engineering geologist must deal with Man as a participant in earth processes.

Engineering geology must, therefore, recognize cultural, social, economic, and engineering contributions in our profession. Since engineering geology is the science of the earth in which Man is a recognized partici-

NEW EDITOR TO TAKE OVER

A new editor will take the helm of the Engineering Geologist with the next issue. Art Keene, geologist for the County of Los Angeles, has agreed to volunteer his services for an unspecified period.

As always, **THE ENGINEERING GEOLOGIST** needs articles, announcements of meetings in which engineering geologists would be interested, job opportunity bulletins, and similar material. No commercial messages, please. Be advised that the next (January 1988) issue should be mailed about January 1. Deadline for contributions to that issue is November 30 (submit your item early if possible). See the guidelines published in the April 1985 issue for suggestions and requirements. Send materials to:

Art Keene
County of Los Angeles
Public Works Dept.
550 S. Vermont Ave., Rm. 408
Los Angeles, CA 90020
(213) 738-4059, 738-4068, or 738-4069

CHAIRMAN'S MESSAGE (Continued)
pant, then the engineering geologist must look back to the geologic record and then look forward to predict the effects of geological factors on engineered works and the impact of the engineered works on earth processes (Figure 1). The engineering geologic corollary to the concept of Uniformitarianism is The recent past is the key to the near future. Thus, engineering geologists are predictors.

If engineering geology is science based within the broader science of geology, then how does engineering geology relate to geology? Geology, according to Webster, is the science dealing with the physical nature and history of the earth. One of the basic concepts in geology is Uniformitarianism, or the present is the key to the past. Classical geology uses present processes and conditions as a guide to interpret the past. Man's physical modifications of the earth and earth processes are only evaluated to determine the natural processes that occurred prior to the arrival of Man. Placed on a time scale, most geologists stand at a time point prior to Man's technology and look back into the history of the earth (Figure 1). Geologists are historians of the earth.

Engineering, as defined in Webster, is

CHAIRMAN'S MESSAGE (Continued)

concerned with putting scientific knowledge to practical use. Thus, engineers look forward from today and modify the environment for beneficial purposes. Engineers have a corollary to Uniformitarianism, Precedent is the key to design, in which the engineer uses Man's past technology as the basis for future designs. The engineer's forward view is, however, constrained by the limitation of the designed economic life of each project. Any engineering that prolongs that life is "over-design." It is interesting to suggest that the Nation's historical engineering projects are examples of over-design by the engineer. Placed on the same time scale as the geologist in Figure 1, the engineer's view is back into Man's technologic history and then forward through the design life of an engineering project. Engineers are innovators.

Since many members of the Division are geological engineers, it is desirable to relate the engineering geologist to the geological engineer in the context of the above discussion. Geological engineers are engineers, thus a geological engineer puts geologic knowledge to a practical use. If this is true, then the general definitions used to define engineering geology as "applied science" or "the application of geology to engineering" are, in fact, definitions of geological engineering.

Since geological engineering is the application of geology to engineering, then what is the practice of engineering geology? The Practice of engineering geology is the interpretation and analysis of earth materials and processes by investigation and study to predict surface and subsurface conditions and the consequences of Man's interactions with these naturally occurring conditions. These interpretations and analyses are carried out to ensure that geologic factors affecting planning, design, construction, operation, and maintenance of engineering works are properly recognized and optimized to protect the public's health, safety, and welfare or the feasibility and economy of engineered projects.

If geology is the study of the earth, engineering geology is the study of the earth and the consequences of human interactions, and engineering geology is the application of science for the benefit of society, then how do they relate in practice?

"The best geologist makes the best interpretation with the least data."
 "The best engineering geologist makes the best interpretation with the least data."
 "The best engineer makes the best project with the least cost."

If we define engineering geology as science, not obviously applicable to engineering or the public, then the academic engineering geologist is obligated to carry out basic research and teaching that advances our knowledge of engineering geology. The practitioner must utilize these newly-developed principles of earth science to predict conditions that affect the public's health, safety, and welfare or the feasibility and economy of engineered works.

If we define geological engineering as engineering, then the academic geological engineer is obligated to carry out applied research and teaching that advances technology in the applications of geology for the benefit of society. The practitioner must utilize these newly developed technologies of engineering to protect the public's health, safety, and welfare or the feasibility and economy of engineered works.

After completing this message, I received a booklet containing abstracts of the papers prepared for Sigma Xi's project on multidisciplinary research. The abstract of Timothy Perper entitled "The loss of innovation: Peer review in engineering geology" could have been titled "Problems with peer review in engineering geology" because engineering geologists are multidisciplinary researchers. Timothy's abstract is reprinted in this issue for your own review and thought. Should you wish further information about Sigma Xi's multidisciplinary Project, contact Alicia K. Dustira, Programs Officer, Sigma Xi, The Scientific Research Society, 345 Whitney Avenue, New Haven, CT 96511.

NECROLOGY

EGD member Thomas W. Fluhr died on January 22, 1987.

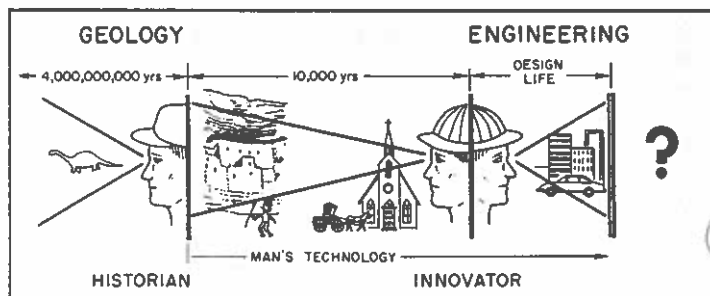
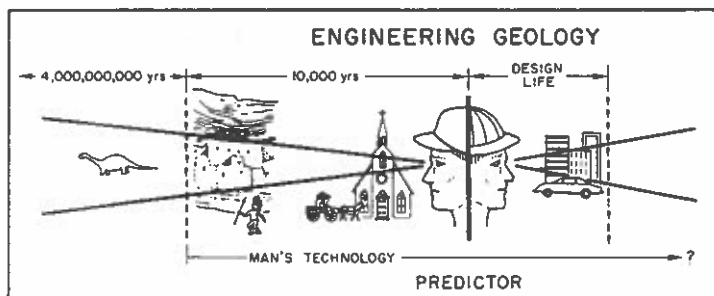


Figure 1. Relationship between engineering geology, geology, and engineering based on fundamental philosophic view of each profession.

**THE LOSS OF INNOVATION:
PEER REVIEW IN MULTI- AND
INTERDISCIPLINARY RESEARCH**

Timothy Perper
Independent Scholar

(Note: This abstract, referred to in the Charman's Message, is reprinted with permission from Timothy Perper, 717 Pemberton Street, Philadelphia, PA 19147, and Sigma Xi, The Scientific Research Society, 345 Whitney Avenue, New Haven, CT 06511, (203) 624-9883.)

Scientific research moves forward through two major processes: answering questions within the known paradigms of a field, and synthesizing new questions and paradigms between two or more fields. The latter is multi- and interdisciplinary research. Such research, often innovative, is particularly sensitive to inept peer reviewing if promising new avenues of investigation are thereby stopped or misdirected.

However, scholarly studies and critiques, personal stories, journalistic commentary, and even scientific humor all indicate that the peer review system is widely mistrusted. Peer review is critical to scientific progress because it controls two "filtering" processes: funding of grant applications at the start of scientific research and, later, making research public in scientific journals and books. Four critical themes have direct implication for interdisciplinary peer review: a) Interdisciplinary science is difficult to evaluate because it is new; b) Evaluation of interdisciplinary results is difficult; c) The grant system favors those who write well; and d) Scientists and the public believe that funding should depend on a principle of equal access for equal merit.

In considering safeguards against incompetent review proposals, I differentiate between multidisciplinary research, when a project progresses serially through several different disciplinary stages, and interdisciplinary research, when a project draws simultaneously from the viewpoints of more than one field. In reviewing multidisciplinary projects, reviewers need to assess each investigator's skills in his/her particular area; moreover, the project head must have demonstrated administrative ability to coordinate the entire effort.

However, in reviewing interdisciplinary research, each investigator must be evaluated for secondary competence in the other field(s) as well as for competence in his/her primary field. Secondary competence involves knowing the major paradigms of the secondary field and its appropriate literature as well as being able to communicate with experts in that field. Likewise, reviewers of such research should possess appropriate secondary competence. Methodologies for interdisciplinary research should be evaluated for their synthesis of methods from both fields, rather than merely by within-disciplinary standards. An additional criterion for adequate review of interdisciplinary research concerns the specificity and clarity of the ideas presented -- they must communicate interest and immediately to a nonexpert. Finally, the closeness of the two fields (measured, for

example, through co-citation analysis or through the development of mediating fields) can reveal incipient, interesting research ideas.

Reviewers of multi- and interdisciplinary research play critical roles in the progress of science and must possess well-educated intuition, flexibility, and sensitivity to their simultaneous responsibility as guardians of competence and innovation.

**1987 GSA SYMPOSIUM:
NEOTECTONICS IN EARTHQUAKE EVALUATION**

Symposium convenors Ellis Krinitzsky and David Burton Slemmons have selected several interesting papers to be presented at the forthcoming GSA annual meeting. The presentations include:

- "Active faults in central United States," by Alan Ramelli and D. Burton Slemmons
- "Application of Paleoseismicity," by Antony J. Crone
- "Seismic hazards assessment in the Pacific Northwest," by Kevin J. Coppersmith
- "Methods for estimating earthquake magnitude for seismic assessment," by Craig de Polo and D. Burton Slemmons
- "Neotectonic movement and earthquake assessment in the eastern United States," by Patrick J. Barosh
- "Evolution of mountain front landforms, north-central New Mexico," by Christopher M. Menges and Stephen G. Wells
- "Seismic hazard assessment in Central United States," by Arch Johnston
- "Neotectonics in the southeastern United States," by Pradeep Talwani
- "Active faults and potential earthquakes in South Dakota," by Thomas C. Nichols, Jr.
- "Deformation and seismicity along the Meers fault, Oklahoma," by Norman R. Tilford

ROBBINS JOINS UNIV. OF CONNECTICUT

Dr. Gary A. Robbins, formerly a Senior Project Hydrologist with Woodward-Clyde Consultants, Santa Ana, California, has joined the Department of Geology and Geophysics, University of Connecticut as an Associate Professor of Hydrogeology and Engineering Geology. The university, located in Storrs, offers M.S. and Ph.D. degrees in geology, hydrology, and engineering geology.

**RECIPIENTS OF THE
DISTINGUISHED PRACTICE AWARD**

First awarded in 1982, the Distinguished Practice Award of the Engineering Geology Division has been presented to recognize outstanding individuals for their continuing contributions to the technical and/or professional stature of engineering geology. Recipients of the annual award are:

- 1982 - Neil B. Steuer
- 1983 - Thomas W. Fluhr
- 1984 - Edwin B. Eckel
- 1985 - Shailer S. Philbrick
- 1986 - George A. Kiersch

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(see above)

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DNAG Volume:

George A. Kiersch
4750 North Camino Luz
Tucson, AZ 85718
(602) 299-3776

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(412) 856-6400

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John F. Gartner
Gartner-Lee Associates Ltd.
Toronto-Buttonville Airport
Markham, Ontario
Canada L3G 3J9
(416) 477-8400

Program Committee and JTPC Representative:

Christopher C. Mathewson
(see above)

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David E. Dunn
School of Natural Science and Mathematics
University of Texas at Dallas
Box 830688
Richardson, TX 75083-0688
(214) 690-2516

U.S. National Committee on Tunneling Technology:

Lloyd B. Underwood
15682 Leavenworth Street
Omaha, NB 68118
(402) 333-3776

U.S. National Committee on Rock Mechanics:

George A. Kiersch (to June 1986)
(see above)

ASCE-GSA-AEG Joint Committee on Engineering Geology:

Lokesh Chaturvedi (1984-87)
State of New Mexico
Environmental Evaluation Group
P.O. Box 968
Sante Fe, NM 87504
(505) 827-5481

Robert T. Pack (1985-88)
Thurber Consultants, Ltd.
4475 Viewmont Avenue, Suite 210
Victoria, BC V8Z 6L8
CANADA
(604) 727-2201

NRC Committee on Ground Failure Hazards:

Thomas L. Holzer
(see above)

**GEOLOGICAL SOCIETY OF AMERICA
1986 ANNUAL REPORT OF
THE ENGINEERING GEOLOGY DIVISION**

**GEOLOGICAL SOCIETY OF AMERICA
ENGINEERING GEOLOGY DIVISION
1987 PROPOSED BUDGET**

1. Status of the Division:

- (a) Financial Condition: Financial balance as of 29 October 1986 is \$9,918.24. Division membership rose from 1164 in 1985 to 1208 in 1986. The 1986 dues remain at \$5.00. The 1987 budget is attached.
- (b) Newsletter: The Newsletter needs help. Two issues were produced. The remaining ones are uncertain. The Chairman will attend to this matter.
- (c) Publications: The Division had no major publication in 1985-86. The DNAG Contribution from the EGD is progressing. An Anniversary volume on Neotectonics in Earthquake Assessment is being planned.
- (d) A 40th Anniversary Award for research in engineering geology was approved by the Division and \$2.00 per member was appropriated as seed money for generating an annual grant. The award is to be managed through the GSA Foundation.
- (e) 1986-87 Officers of the Division are: Christopher C. Mathewson, Chairman
Ellis L. Krinitzsky, Chairman-Elect
Thomas L. Holzer, Secretary
Robert H. Fakundiny, Mgmt. Board Rep.

2. 1986 Division Awards:

- (a) The E.B. Burwell, Jr., Memorial Award was presented to Drs. James F. Quinlan and Ralph O. Ewers for their paper "Ground Water Flow in Limestone Terranes," published in the National Symposium and Exposition on Aquifer Restoration and Ground Water Monitoring Proceedings, 1985.
- (b) The Distinguished Practice Award was presented to Dr. George A. Kiersch.
- (c) The Meritorious Service Award was presented to Dr. Ellis L. Krinitzsky.

3. Annual Meetings:

- (a) 1986 Annual Meeting and Symposium, San Antonio, Texas: A full-day Engineering Geology Division Symposium on "Engineering Geology in Public Policy" was presented on 10 November 1986. The sessions were chaired by Christopher C. Mathewson and John C. Scott. A field trip titled "Engineering Geology of San Antonio, Texas" was led by Jeffrey R. Walker and Edward G. Miller.
- (b) 1987 Phoenix, Arizona, 26-29 October. A program is being developed by Ellis Krinitzsky and David B. Slemmons for a half-day symposium to be titled "Neotectonics in Earthquake Assessment." The papers will be collected into an anniversary volume for the Centennial of the GSA. Other contributions to the Annual Meeting are still under consideration.
- (c) 1988, Denver, Colorado, GSA Centennial: T. Holzer to coordinate.

Respectfully submitted,
(signed)
Christopher C. Mathewson
Chairman, Engineering Geology Division
Geological Society of America

Division Income

Dues, @ \$5/member, 1000 paid \$5,000.00

Division Expenses

Mailing Labels	300.00
Newsletter, 4 issues	3,000.00
Division Ballots	200.00
Envelopes, Postage	750.00
Cost of 1987 Annual Meeting	400.00
Anniversary Award	2,000.00
Award Items	400.00

Total Expenses \$7,050.00

Budget Impact on Division Financial Condition

1986 Division Balance	\$9,918.24
1987 Income	5,000.00
1987 Budget	7,050.00
1987 Division Balance	7,868.24

**BIOGRAPHIES OF THE CANDIDATES
ENGINEERING GEOLOGY DIVISION, GEOLOGICAL SOCIETY OF AMERICA**

ELLIS L. KRINITZSKY was born in 1924 in Norfolk, VA. He received his BS degree in Mining Geology from Virginia Polytechnic Institute in 1945, his MS degree in Geology from the University of North Carolina in 1947, and his PhD degree in Geology from Louisiana State University in 1950. He has worked for Creole Petroleum Corporation and for the U.S. Army Corps of Engineers in geological capacities. He is an engineering geologist at the Waterways Experiment Station, Vicksburg, MS, and acts as a consultant to the Corps of Engineers throughout the United States. He is a member of the Association of Engineering Geologists, the Seismological Society of America, and the Earthquake Engineering Research Institute, among others. He received the 1984 Publication Award from the Association of Engineering Geologists for his article entitled "Principles for Selecting Earthquake Motions in Engineering Design." His research interests include studies of earthquake hazards, alluvial soils, river behavior, and use of radiation in soils laboratory testing. His current address is: P.O. Box 631, Waterways Experiment Station, Vicksburg, MS 39180.

THOMAS L. HOLZER was born in 1944 in Lafayette, IN. He received his BSE degree in Geological Engineering from Princeton University in 1965, his MS in Hydrology from Stanford University in 1966, and his PhD in Geology from Stanford in 1970. From 1970 to 1975, he taught hydrogeology and engineering geology at the University of Connecticut. In 1975, he became a Research Geologist with the U.S. Geological Survey in Menlo Park, CA. From 1982 to 1984, he served as USGS Deputy Assistant Director for Research in Reston, VA. He is the editor of the Newsletter of the Hydrogeology Division of the Geological Society of America and of Reviews in Engineering Geology, Volume VI, *Haz Induced Land Subsidence*. He is a member of the American Geophysical Union, the National Water Well Association, and Sigma Xi. His research interests include studies of ground failure associated with land subsidence and earthquake induced liquefaction. His current address is: U.S. Geological Survey, M.S. 977, 345 Middlefield Road, Menlo Park, CA 94025.

JEFFREY R. KEATON was born in 1949 in Pittsburgh, PA. He received his BS degree from the University of Arizona in 1971 and his MS from the University of California at Los Angeles in 1972. He has worked as engineering geologist with Dames and Moore in Los Angeles from 1971 to 1979 and in Salt Lake City, UT, from 1979 to 1986. He is a member of the Association of Engineering Geologists, International Association of Engineering Geologists, and American Society of Civil Engineers. His research interests include engineering geology of alluvial fans and hazards from debris flows, landslides, and earthquakes. His current address is: EarthStore, Dames and Moore, 250 E. Broadway, Suite 200, Salt Lake City, UT 84111.

PERRY H. RAHN was born in 1936 in Allentown, PA. He received his BS degree in Civil Engineering and BA degree in Geology from Lafayette College in 1959 and his PhD in Geology from the Pennsylvania State University in 1965. He has taught engineering geology, ground water, and geomorphology at the South Dakota School of Mines and Technology since 1968. He is a Professor of Geology and Geological Engineering. He has worked for the California Department of Water Resources, the University of Connecticut, and Argonne National Laboratory. He serves on the Burwell Award Committee. In 1986 he published a textbook, *Engineering Geology, an Environmental Approach*. He is a member of the Association of Engineering Geologists, National Association of Geology Teachers, National Water Well Association, Association of Professional Geological Scientists, and the National Society of Professional Engineers, among others. His research and consulting interests include regional hydrogeology and applied geomorphology studies and the application of engineering geology to urban planning. His current address is: Department of Geology and Geological Engineering, South Dakota School of Mines and Technology, Rapid City, SD 55701.

**INTERNATIONAL ASSOCIATION OF ENGINEERING
GEOLOGISTS TO MEET IN GREECE**

The International Association of Engineering Geologists (IAEG) will sponsor the "International Symposium on Engineering Geology as Related to the Study, Preservation and Protection of Ancient Works, Monuments, and Historical Sites," September 19 to 23, 1988, in Athens, Greece.

The symposium will include trips to several archaeological sites, including Delphi, the Acropolis of Athens, and the temple of the Parthenon.

Official languages of the meeting are English, French, and Greek (the first circular specifies that papers should be presented in English or French).

Contributed papers and poster papers are invited but must relate to one of the following themes:

- Engineering geology and the protection of historical sites and monuments
- Engineering geology and building stones of historical monuments
- Engineering geology and archaeological exploration
- Engineering geology and hazards in the course of history
- Environmental geology and historical sites
- Engineering geology in engineering works in the antiquity (i.e., ground foundation conditions and stability of ancient works, ways of confronting problems in ancient times)

For more information, contact:

Greek Committee of Engineering Geology
1988 Symposium Secretariat

P.O. Box 19140
GR-117 10 Athens
GREECE

(TELEX: 45 4312 POLX (c/o Prof. Paul G. Marinos))

UPCOMING MEETINGS OF NOTE

30th Annual Meeting, Association of Engineering Geologists, October 8 to 13, 1987, Atlanta, GA (Robert T. Dickerson, 3511 Evans Mill Road, Lithonia, GA 30058).

32nd Annual Midwest Groundwater Conference, October 28 to 30, 1987, Madison, Wisconsin (contact Jim Krohelski, USGS, 6417 Normandy Lane, Madison, WI 53719-1133; (608) 276-3850).

International Waste Management Conference, November 29 to December 5, 1987, Hong Kong (contact Gloria Greene, ASME Professional Development Dept., 345 East 47th St., New York, NY 10017; (212) 705-7398).

Second International Conference on Case Histories in Geotechnical Engineering, June 1 to 5, 1988, St. Louis, MO (contact Shamsher Prakesh, Room 308, Dept. of Civil Engineering, University of Missouri, Rolla, MO 65401; (314) 341-4461).

Fifth International Conference on Permafrost, June 1988, Trondheim, Norway (contact V International Conference on Permafrost, Norwegian Institute of Technology, Studies Administration, N-7034 Trondheim-NTH, Norway).



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