The Engineering Geologist

THE GEOLOGICAL SOCIETY OF AMERICA
3300 Penrose Place · Boulder, Colorado 80301

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

Volume 10 Number 1 May 1975

1974 Annual Report

Membership

The Division had an official membership of 1,339 as of September 1974, which represented a gain of about 300 in a year. The EGD account at GSA headquarters was $3,094 as of August 31, 1974.

Management Board

No Management Board meetings have been held since the Annual Meeting in Dallas, Texas. The minutes of that meeting have been submitted to GSA headquarters. Frequent communication between board members has been maintained by mail and telephone throughout the year. The 1974 Management Board consisted of the following members: Howard J. Pincus, Milwaukee, Wisconsin, Chairman; Paul L. Hilpman, Lawrence, Kansas, Chairman-Elect; Richard W. Galster, Seattle, Washington, Secretary; David J. Varnes, Denver, Colorado, Management Board Representative.

Nominees for the 1975 board were Paul L. Hilpman, Chairman; and James W. Skehan, Chairman-Elect; with Messrs. Varnes and Galster continuing for a second year.

E. B. Burwell, Jr., Award

The E. B. Burwell, Jr., Award for 1974 was presented to Robert F. Legget for his book entitled "Cities and Geology" published by McGraw-Hill in 1973. The award was presented by David J. Varnes at the Engineering Geology Division luncheon on November 18, 1974.

1974 Annual Meeting

Division contributions to the Joint Technical Program in Miami included sponsorship of a session on "Faults and Landslides," a symposium organized by Erhard M. Winkler on "Preservation of Stone," and co-sponsorship with the Geochemical Committee of a session relating to "Environmental Geology" with respect to soils and geochemical problems. The Division's representative on the Joint Technical Program Committee was Paul L. Hilpman.

Publications

Three issues of *The Engineering Geologist* were published during the year under the editorship of Mary E. Horne. Engineering Geology Case Histories Number 10, "Geologic Mapping for Environmental Purposes," edited by Harry Ferguson, was published.

Coordination with Association of Engineering Geologists

Further efforts have been made for closer ties between AEG and EGD-GSA. These efforts were begun in October and November 1973 by persons holding memberships in both groups. AEG has revised its annual meeting schedule in order to meet adjacent to the GSA Annual Meeting in Seattle in 1977 and combine certain activities between EGD-GSA and AEG. We, in turn, are making efforts to have AEG representation on the GSA-ASCE Joint Committee on Engineering Geology. (As of press time, this effort has been accomplished.)

Committees

Committee activity and liaison with the several GSA regional sections has been variable. Reports of these activities are included in this issue of the newsletter.

Richard W. Galster
Secretary, EGD-GSA

Engineering Geology Division, GSA

CALL FOR PAPERS
for the 1975 Annual Meeting, Salt Lake City

Those planning to submit papers for presentation at the Annual Meeting in Salt Lake City should note that there is a deadline of *July 1, 1975,* for submission of abstracts to GSA headquarters.

Standard GSA abstract forms may be obtained from Abstracts Secretary, Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301.

Be sure to check the proper category on your completed abstract form. This is of great help not only to the Division but to the Screening Committee and the Joint Technical Program Committee as well.

Committee and Liaison Reports for 1974

Engineering Seismology

A National Academy of Engineering panel concerned with earthquake engineering problems concluded that the instrumentation of foundations, embankments, dams, and other structures throughout seismic regions of the United States would provide the best opportunity for obtaining information on the effects of earthquakes. They emphasized that there was a need to perfect new inexpensive instruments that can be deployed in large numbers. The need for instrumenting full-scale structures to provide data to correlate with model studies was pointed out by the panel along with the need for developing improved techniques and procedures for processing and interpreting the data.

A conference at Pacific Grove, California, was held December 8-13, 1974, that dealt with the effects of earthquakes on engineering lifeline systems.

The U.S. National Conference on Earthquake Engineering will be held June 18-20, 1975, in Ann Arbor, Michigan. The topics to be included are seismology, seismic risk, soils and structural response, tests, standards, essential services, utilities, transportation systems, and nuclear and industrial plants.

The Sixth GEOP Research Conference was held at the University of California, San Diego, February 4-5, 1974. This conference dealt with earthquake mechanisms and displacement fields close to fault zones. A report on this conference will be published in *EOS* Transactions, American Geophysical Union.

The National Bureau of Standards has published Technical Note 807 entitled "Building Performance in the 1972 Managua Earthquake." The report can be purchased from the Superintendent of Documents for $1.60.

NOAA has made available all strong-motion earthquake data from their files dating back to 1932. Copies of the records are available full-size for $1.50 per record or on 70-mm film chips for 50 cents per record. A chronological listing of all records since 1932 may be purchased on seven reels of 35-mm microfilm at $10 per reel. These are available from National Geophysical and Solar-Terrestrial Data Center, NOAA/EDS, Boulder, Colorado 80302. *David E. Willis*

DIVISION NECROLOGY

John W. Ambrose, William H. Bussey (4/8/72), Dean S. Carder (2/12/73), Henry T. Carswell, J. M. Dwight, Jr., D. Hoye Eargle (3/11/73), Hoichi Hirota (10/12/72), Marjorie K. Korringa (9/8/74), Roger Rhoades (12/29/72), Hubert E. Risser (9/5/74), Leroy M. Tucker (11/3/72), Dart Wantland (5/6/73), Robin Willis (12/3/73), and Don E. Wolcott (4/22/74).

Underground Excavation

Three major conferences relating to underground excavation were held in 1974.

The 2nd Rapid Excavation and Tunneling Conference was held in San Francisco June 24-28, 1974. The subject topics included "Site Investigation" and "Soil and Rock Mechanics" for tunnels and other underground construction.

The topic for the 1974 Engineering Foundation Conference held at New England College, Henniker, New Hampshire, August 11-16, 1974, was "Subsurface Exploration for Underground Excavation and Heavy Construction." Among the presentations at the conference were "Important Parameters in Subsurface Exploration in Rock Tunneling," "Acoustic Techniques Suitable for Use in Soil," "Exploring for Soft Ground Tunnels, Some New Ideas," "A Recommended Borehole Investigation System for Soft Ground," "Measurement of In-Situ Stress in Soils," "Electrical Resistivity and Borehole Geophysical Studies for Engineering Applications," and "Recent Progress in Rock-Probing Radar."

The 3rd International Congress of the International Society for Rock Mechanics was held in Denver, Colorado, September 1-7, 1974. Included among the theme topics was "Analysis and Design of Permanent and Temporary Underground Openings in Rock."

James C. Gamble

Natural Construction Materials

Papers are being collected, collated, and edited of the two previous symposia presented at GSA Annual Meetings: 1972, "Stone Properties," and 1973, "Stone Decay," for later publication jointly with papers from the 1974 symposium on "Stone Preservation."

Symposium on "Stone Preservation" was presented by this committee in Miami Beach, November 19, 1974. The following papers were included in the session: "The Basis for Stone Preservation" (Introduction), E. M. Winkler; "The Physical Chemistry of Stone Preservation," S. Z. Lewin; "A Laboratory Evaluation of Stone Preservatives," G. A. Sleater; "Certain Epoxies, Silicones, and Vinyls as Stone Preservatives," K. Lal Gauri; "Properties of Laser-Cleaned Carrara Marble Surfaces," J. F. Asmus; "Recent Advances of Stone Conservation in Germany," J. Riederer; and "Restoration of Borobudur Temple, Indonesia," G. Hyvert.

An annotated bibliography on stone decay and stone preservation is being prepared for publication in *The Engineering Geologist* as a continuation of a previous effort.

Like last year in Dallas, our Committee on Natural Construction Materials met in Miami Beach to discuss plans for the coming year. *Erhard M. Winkler*

(continued on p. 3)

COMMITTEE AND LIAISON REPORTS FOR 1974

— CONTINUED —

Liaison with the American Society of Photogrammetry

The American Society of Photogrammetry is interested in, among other things, the interpretation of photographs and other remote sensing techniques. ERTS-1 imagery, which falls in this category, has provided a new tool for analysis of physical features of the Earth's surface. Although ERTS-1 imagery cannot be classed as a "little black box" to solve all problems of man, its desirability has increased significantly in the past year. At the annual meeting of the Society, held in St. Louis in March 1974, several papers were given that should be of interest to engineering geologists. These are listed to show the wide variety of information available.

1. *Remote Sensing for Land Use Inventory and Land Suitability Analyses in South Central Iowa,* by Cooper, Tarawk and Tuthill of the Iowa Geological Survey. (Many different remote sensing techniques were used here.)

2. *Remote Sensing and Photogeology—Mineral Exploration,* by Estrin, Wolstenholme and Pilner, Planning Consultants of Mahopac, New York.

3. *An Application of Airphoto Analysis to a Cave Location Study,* by Jack Rinker of the U.S. Army Engineer Topographic Laboratories.

4. *Photographic Quantification of Water Quality in Mixing Zones,* by Lissesand, Scarpace, and Clapp, of the University of Wisconsin.

5. *ERTS-1 Data Analysis of the 1973 Mississippi River Flood,* by P. F. Guss of Lockwood, Kessler and Bartlett. (He was able to compute flooded acreages even after the crest of the flood had passed.)

In the September 1974 meeting held in Washington, D.C., papers of interest included "Remote Sensing for Regional Resource Analysis," by Mintzer and Dowdy of the Ohio State University; "Application of ERTS-1 Data to the Corps of Engineers Work Mission," by Lt. Scott Sollers; and "Trends in Use of Remote Sensing for State Resources and Environmental Management," by Frank Wobber of IBM. The above papers show the wide variety of applications to engineering geology that remote sensing has to offer.

An obvious use that was not touched on in these sessions is the occurrence of seismic activity, most important, for instance, to those involved in nuclear power plant site evaluation. In this connection a symposium entitled "Tectonics of the Middle Atlantic States as Analyzed by Remote Sensing Techniques" is planned for March 1975 in Washington, D.C. Here the use of ERTS-1 imagery in determing the location of potential earthquakes will be discussed. *C. F. Withington*

PLEASE NOTE
NEW MAILING ADDRESS FOR EDITOR

Ms. Mary E. Horne
134 Crescent Ave.
Buffalo, New York 14214

GSA NORTH-CENTRAL SECTION MEETING: HIGHLIGHTS FOR ENGINEERING GEOLOGISTS

The Annual Meeting of the North-Central Section of GSA will be held in conjunction with the Annual Meeting of the Geological Association of Canada and the Mineralogical Association of Canada at the University of Waterloo, Waterloo, Ontario, Canada, May 15-17, 1975.

Almost 400 papers will be presented. Technical Sessions and Symposia of possible interest include *Environmental Aspects of Mineralogy and Sedimentary Geochemistry* (May 15); *Geomorphology* (May 15); *Quaternary* (May 15, May 16); *Permafrost* (May 16); Contamiternary (May 15, May 16); *Permafrost* (May 16); *Contaminants in Sub-surface Flow Systems* (May 16, May 17); *Environmental Isotopes* (May 16); *The Great Lakes Basin—Interaction between Terrestrial and Aqueous Systems* (May 17); *Environmental Aspects of Marine Geology* (May 17); *Environmental Geology* (May 17).

Seven pre-conference and five post-conference field trips are planned, including *Engineering Geology, Niagara Peninsula* (May 13-14), and *Environmental Geology, Kitchener-Guelph area* (May 18).

For more information, write to Department of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada. Regarding accommodations, write to Owen L. White, Department of Civil Engineering, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada, or phone 519-885-1211, ext. 3875.

The Accompanying Members' program includes visits to (a) Niagara Falls (May 15), (b) Grand River Conservation areas and Doon Pioneer Village (May 15), and (c) Waterloo County — visits to Mennonite farms, buggy works, old general store, antique shops, etc. (May 16)

—*Owen L. White,* North-Central Liaison

NOMINATIONS SOUGHT FOR 1976 OFFICERS

The EGD Nominating Committee is calling for nominations from the membership at large for the 1976 slate of officers.

Offices to be filled following the Salt Lake City Annual Meeting in October are Chairman, Chairman-Elect, Secretary-Treasurer, and Management Board Representative (two-year term).

Any member of the Nominating Committee will be glad to receive your nominations *by June 15, 1975.* Please include a note explaining the special qualifications of your candidates for particular jobs.

The Nominating Committee consists of

Howard J. Pincus (Chairman)
Department of Geology, Sabin Hall
University of Wisconsin
Milwaukee, Wisconsin 53201

Richard J. Proctor
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Arcadia, California 91006

Samuel C. Sargent
3925 Chesterbrook Road
Arlington, Virginia 22207

Underground Disposal of Coal Mine Wastes

"Underground Disposal of Coal Mine Wastes," National Research Council, is available at $6.25 a copy from the Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418. Chairman of the committee that made the study was Charles Fairhust, head, department of civil and mineral engineering, University of Minnesota. Nine other committee members worked on the study including two EGD members—Richard E. Gray, Vice-President of GAI Consultants, Inc., and Genevieve Atwood, staff officer for the NRC. The following report was released by the National Research Council on March 20, 1975.

WASHINGTON—Thousands of large active and abandoned waste piles are found in U.S. coal-mining areas—3,000 to 5,000 in eastern coal fields alone—and cause "serious environmental and social stress." With increased coal production brought about by the energy crisis, the disposal of these wastes is becoming an increasingly urgent problem.

It is technologically feasible to put coal mine wastes back into most of the mines from which they came. How easily it can be done depends upon the original mining methods used in coal removal. It is not economically feasible in many current operations and would add substantially to the costs of producing coal.

These are among the conclusions of a study issued today by the National Research Council (NRC) and made at the request of the National Science Foundation.

The waste piles "have been the direct cause of death of mine workers and local inhabitants, and the source of severe local air pollution and stream and groundwater pollution as well as having had regional, economic, psychological and sociological impacts," according to the report.

Asked to assess the technological and economic feasibility of returning coal mine wastes to mined-out areas underground, the study group concluded that it is technologically feasible but is not generally economically feasible. Among its other findings were that:

☆ The costs of underground waste disposal vary with the site and other conditions, but would be less in new mines designed for underground disposal.

☆ Backfilling of active mines poses unresolved problems related to the health and safety of coal miners and would require changes in mine safety laws.

☆ Technology is now available for surface disposal of mine wastes in a safe and nonpolluting way and offers a viable alternative to underground disposal "provided stringent regulations for construction and maintenance of surface disposal areas are strictly enforced."

☆ More consideration should be given to coal mine waste as a potential resource—its current uses as landfill on construction sites and in highway building are not sufficient in view of rapidly accumulating supplies.

☆ If underground disposal should become mandatory, a means should be found to help mine operators who would be economically hurt from such a change in mining operations. "Safe and nonpolluting disposal is the responsibility of the operator," the study says. "If regulations are imposed that exceed this obligation, society must recognize its responsibility to avoid inequitable distribution of added costs to some operators."

☆ At a minimum, it would add $1 to $4 to the cost of a ton of coal to stow wastes underground even "under unusually favorable mining conditions and average conditions of waste production."

The conclusions on technical feasibility were based on experiences in active coal mines in Europe and in limited backfilling of abandoned mines in the United States. The report describes these experiences and suggests areas requiring further experimentation.

The report suggests, in a discussion of social and legal factors, that a more coherent policy is needed concerning waste disposal which delineates enforcement responsibilities between state and the several federal jurisdictions. It also describes problems requiring government attention.

A section of the report on research needs suggests a cooperative international program to collect and disseminate latest technological advances and the operation of demonstration projects at active mines to determine health and safety hazards and how they may be eliminated in practice.

New Publications

Geology and Earthquake Hazards, Planning Guide to the Seismic Safety Elements of Kern County, California
Pierre St. Amand, René L. H. Engel, William H. Park, and Bradley F. Williams, Kern County Council of Governments, 1106 26th Street, Bakersfield, California 93301 (1974), 205 pages and atlas: 138 quadrangles and 5 general maps.

Rock Mechanics: The American Northwest
Excursion Guide, Third International Congress on Rock Mechanics, Barry and M. A. Voight, Editors, Experiment Station, College of Earth and Mineral Sciences, Mineral Sciences Building, The Pennsylvania State University, University Park, Pennsylvania 16802 USA (1974), 296 pages. A wide-ranging survey of rock mechanics and engineering geologic problems associated with major civil and mining engineering efforts and with tectonophysical interpretations of earth deformation. Regional geology is systematically considered, providing a structural cross section from the Great Plains to the Pacific Ocean with special emphasis on the National Park regions of Yellowstone, Grand Teton, Glacier, and Mt. Rainier. Cost - $10 per copy, plus $1 for postage and handling.

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MARLIAVE FUND – STUDENT LOANS

Purpose: Intended primarily to assist graduate students in engineering geology, but not necessarily restricted to students of colleges or universities granting formal degrees in engineering geology.

Eligibility: Awards will be made on the basis of demonstrated ability, character, potential contributions to the profession of engineering geology, and need.

Conditions: Awards will generally be as loans, but small grants may occasionally be made. Amount of loan will be determined on the basis of need, with an upper limit of $2,000. Half of the loan is to be repaid by the end of the first year, and the remainder by the end of the second year after the recipient leaves school. Interest will be charged at three percent on the unpaid balance per year, starting on the date of completion of residence studies. If a loan is not completely repaid at the end of two years, the interest rate on the unpaid balance will be increased to the then current prime rate charged by the First National City Bank of New York.

For application forms, write to Marliave Scholarship Committee, Association of Engineering Geologists, 8310 San Fernando Way, Dallas, Texas 75218. Applications for loans for any academic year should be submitted not later than the preceding May.

NOTICE

Be sure to check the proper category on your completed abstract form.

MEETING ANNOUNCEMENTS

1975 Engineering Foundation Conference

An Engineering Foundation Conference on the topic of "Environmental Aspects of Hydroelectric and Pumped Storage Projects" has been scheduled the week of August 24-29, 1975, at Franklin Pierce College, Rindge, New Hampshire. Co-chairmen of the conference are Joseph G. Alesi and Neil J. Wilding of EBASCO Services, Inc.

The program's purpose is to embrace problems in planning and siting of hydroelectric facilities and to establish criteria for the development of environmentally sound hydroelectric projects from their inception. The conference format provides a forum for multidisciplinary exchanges and permits the creation of working groups which are necessary to formulate a coherent engineering-environmental policy. These criteria will serve to guide the future siting, design, and development of multiple use of hydroelectric projects.

Attendance is limited to 100 participants. All participants are expected to register in advance of the conference. The conference fee is $195, which covers registration, meals, double occupancy accommodations, and gratuities. Single rooms are an additional $15. The guest fee is $110, which provides double occupancy and meals. Address further inquiries to the Engineering Foundation, 345 East 47th Street, New York, New York 10017.

Tunneling Symposium

The British Tunneling Society is planning a symposium on tunneling to be held in London during March 1976. For more information, contact the British Tunneling Society, Institute of Civil Engineers, 1-8 Great George Street, London, S.W. 1P-3AA, England.

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