

The Engineering Geologist



THE
GEOLOGICAL SOCIETY
OF AMERICA

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

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ENGINEERING GEOLOGY DIVISION • 1972 ANNUAL REPORT

As indicated in the Bylaws, "... the Annual Report of the Division will be presented to the affiliates of the Division ..." so we herewith present the Annual Report.

Management Board

In 1972, the Management Board consisted of:

Chairman	Richard E. Gray
Chairman-Elect	Gordon W. Prescott
Secretary	Emery T. Cleaves
Management Board Representative	Howard J. Pincus
Past-Chairman	Howard A. Coombs

Two Management Board meetings were held during the year, both on November 13, 1972, in Minneapolis, Minnesota. All of the Management Board members, except Past-Chairman Howard A. Coombs, were present. In addition, L. A. Brown, H. F. Ferguson, P. L. Hilpman, and E. M. Winkler were in attendance. The second meeting, that of the 1973 Management Board, immediately followed the completion of the business of the 1972 Board.

25th Anniversary of the Division

The first meeting of the Engineering Geology Division was held in 1947 at Ottawa, Canada. In recognition of this event, a 25th Anniversary booklet listing the past meetings, Division Chairmen, and Division sponsored publications was prepared and distributed to all affiliates of the Division. At the Division's annual luncheon on November 14, 1972, in the Leamington Hotel, Minneapolis, Dr. Robert F. Legget, Past-Chairman of the Engineering Geology Division and Past-President of The Geological Society of America, reviewed the development of engineering geology during the 25-year history of the Division and looked to the future in a talk entitled, "1947-1972-1997." This presentation was circulated to all Division affiliates in the first issue of *The Engineering Geologist* for 1973.

Burwell Memorial Award

The recipient of the fourth E. B. Burwell, Jr., Memorial Award was Mr. Richard J. Proctor of Arcadia, California, for his paper, "Mapping Geological Conditions in Tunnels," *AEG Bulletin*, Vol. 8, No. 1. The award, for a paper of distinction which advances knowledge concerning principles or practice of engineering geology or of the related fields of applied soil or rock mechanics where the role of geology is emphasized, was presented to Mr. Proctor during the Engineering and Geology Division's annual luncheon in Minneapolis.

Publications

The proceedings of the Division sponsored symposium on "Geological Factors in Rapid Excavation" (Engineering Case Histories No. 9) is now being printed and should be available in April 1973. George Kiersch, Chairman of the Publications Committee, volunteered to act as Associate Editor for Engineering Geology Case Histories No. 10 containing papers on landslides. Two issues of *The Engineering Geologist*, the Division's newsletter, were published in 1972, as well as a pamphlet in recognition of the 25th anniversary of the Division.

Bylaw Revision

The proposed revisions to the Division Bylaws, which had been prepared by the Long Range Planning Committee, were reviewed and approved by the Management Board. Subsequent review at GSA Headquarters resulted in suggestions for additional changes to provide conformity with other Divisions in the Society. The Management Board voted to adopt the suggested changes and authorized the Chairman, R. E. Gray, to make necessary editorial changes in cooperation with GSA Headquarters so that both Division affiliates and Council approval can be obtained in 1973.

Division Operations

A change in the past year to improve the operations of the Division was the appointment of reporters for technical areas (construction materials, dams and reservoirs, engineering seismology, river engineering, and underground excavation) which in the past have been covered by technical committees. The reporters are to provide news items of interest to the Division's newsletter and keep the Management Board informed of important activities. When required, a reporter can serve as a nucleus for a committee to advise

Tunneling Technology Newsletter

This month you are receiving two newsletters! The U.S. National Committee on Tunneling Technology has published the first issue of its newsletter. In an effort to reach individuals who may wish to subscribe to the newsletter, GSA offered to circulate the first two issues of the Tunneling Technology Newsletter to members of the Engineering Geology Division. Subscription information appears on page 10 of the Tunneling Technology Newsletter.

the Division on a particular topic or to organize a session. The duties of the Division's Section Liaison Representatives were also redefined to provide a closer contact between the Division and the GSA sections. Currently, they keep the Management Board informed on Section activities pertinent to engineering geology, advise Section Chairmen in matters relating to engineering geology, and provide our Newsletter Editor with items of Division interest from their sections.

U.S. National Committee on Tunnel Technology

This committee was organized in 1972 under the auspices of the National Academy of Sciences and National Academy of Engineering to serve as a focal point for underground construction technology development. The committee will operate within the National Research Council's Division of Earth Sciences. The NRC serves as the operating agency for both the NAS and NAE. The committee was established at the request of Edward E. David, Jr., the President's Science Advisor, on the recommendation of the Federal Interagency Committee on Excavation Technology. The 24 voting members include 18 individual memberships – six each from government, industry, and academic or research organizations – and one member from each of six societies or agencies. These are: Inter-Agency Committee on Excavation Technology, ASCE, AIME, GSA, AEG, and AGC. The Executive Committee will consist of the six society representatives and the three officers. This will give GSA a direct voice in guiding the committee. Howard J. Pincus was appointed to represent GSA at the recommendation of the Division. Don U. Deere, Chairman of the committee, is also a member of the Engineering Geology Division. Other members of the Engineering Geology Division on the committee are: John W. Handin, Richard J. Proctor, Lloyd B. Underwood, and Richard E. Gray.

Technical Meetings

Donald H. Yardley served as the Division's Joint Technical Program Chairman Representative for the Minneapolis meeting. Division sponsored technical sessions were held on November 14 and 15, 1972. In addition to sponsoring a session on engineering geology, two symposiums were presented. Harry F. Ferguson, one of the Division's representatives on the Joint GSA-ASCE Committee

on Engineering Geology, organized a symposium on "Environmental Geology Mapping" and Erhard Winkler organized a symposium on "Natural Construction Materials."

25th Anniversary Luncheon

The annual luncheon and business meeting was held on November 14, 1972, in the Leamington Hotel, Minneapolis. Fifty members attended, including GSA President Luna B. Leopold, President-Elect John C. Maxwell, and Executive Secretary Edwin B. Eckel. Chairman R. E. Gray briefly reviewed the Division's activities during 1972, introduced the other members of the Management Board, and thanked them and all active members of the Division for their support. Division officers and committee members for 1972 are indicated on the attached list. The Division's JTPC Representative for the Minneapolis meeting, Donald H. Yardley, was also introduced and thanked for his efforts. It was reported that in 1972 the Division membership was 1,007.

The highlight of the 25th Anniversary Luncheon was an address by Dr. Robert F. Legget. Chairman Gray turned over the leadership of the Division to the Chairman for 1973, Gordon W. Prescott, who introduced the other elected members of the 1973 Management Board; namely, Chairman-Elect Howard J. Pincus, Secretary Emery T. Cleaves, and Management Board Representative Paul L. Hilpman.

1973 ANNUAL MEETING

November 12-14, 1973

Statler Hilton Hotel, Dallas, Texas

James Brooks, General Chairman

Claude C. Albritton, Program Chairman

Forms for submitting abstracts for consideration by the Program Committee are now available. To obtain copies write to Abstracts, The Geological Society of America, Inc., 3300 Penrose Place, Boulder, Colorado 80301.

Deadline for receipt of the abstracts on the forms is July 15, 1973. Abstracts received at the Society Headquarters after that date will not be considered by the Program Committee.

A list of the symposia to be held appears in the April issue of *The Geologist*. Further information will be published in the May and August issues of *Geotimes*.

THE ENGINEERING GEOLOGIST

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Division Officers - 1973

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THE ENGINEERING GEOLOGIST is issued by THE GEOLOGICAL SOCIETY OF AMERICA, Engineering Geology Division, 3300 Penrose Place, Boulder, CO 80301.

3RD CONGRESS OF THE INTERNATIONAL SOCIETY FOR ROCK MECHANICS

The 3rd International Congress of the International Society for Rock Mechanics will be held in Denver, Colorado, September 1-7, 1974. The objective of this congress is to ascertain, on an international scale, the advances that have been made in rock mechanics since the 2nd International Congress of the ISRM and to indicate directions for future effort. Each theme will be reviewed by a General Reporter and discussed by a panel of experts. Selected individual papers will be presented by their authors and discussed in other sessions. All registrants will receive three volumes of the congress papers in advance and a fourth volume containing the discussions following the congress.

OFFICIAL THEMES FOR THE CONGRESS

Mechanical Properties of Intact Rock and Rock Masses. Theme 1 will deal with the characterization and rational description of the mechanical properties of intact specimens and rock masses for both static and dynamic loading. Sample topics: the fundamental nature of rock properties; characteristics of rock surfaces; laboratory and field description of rock fissuring; use of techniques such as seismic velocity and resistivity to characterize intact specimens, rock masses, and discontinuities.

Although rock properties will be discussed in papers submitted for inclusion in other themes, papers in Theme 1 will be distinguished by the *general* applicability of the paper, in contrast to the more specific discussion of rock properties with respect to the particular applications in other themes.

Tectonophysics. Theme 2 will be concerned with physical, mechanical, thermal, and related tectonic processes in the earth, and their effect on the behavior of rock. Sample topics: creep and plastic deformation of rock; the mechanics of faulting and earthquake studies, including discussion of earthquake source parameters, and effects of pore fluids; numerical and analog modeling of rock folding and faulting; tectonic stresses and strains and measurement techniques; heat flow studies and analysis of geothermal effects.

Surface Workings. Theme 3 will be concerned primarily with the application of rock mechanics in the analysis and design of foundations, slopes, and other surface structures in rock. Sample topics: analytical and experimental methods for the determination of engineering properties of rock masses, stability of foundations and slopes, engineering problems of fluid pressure in rocks, artificial strengthening or improvement of rock properties.

Underground Openings. Theme 4 will discuss the analysis and design of permanent and temporary underground openings in rock. Sample topics: deformability, strength and stability of underground openings, ground control in mining systems, well-bore stability (petroleum engineering), effects of underground extraction (both of rock and fluids) on rock mass and the surface, underground storage caverns, support of tunnels and underground openings.

Fragmentation Systems. Theme 5 will be concerned with theoretical and applied studies of rock fragmentation and comminution. Sample topics: fragmentation by mechanical, explosive, thermal, or hydraulic loading; design of blasting patterns; rock fragmentation in tunneling machines and in drilling; comminution; systems approach to fragmentation.

SUBMISSION OF PAPERS

Authors from the United States who wish to submit papers to be included in the proceedings of the 3rd Congress should send triplicate copies no later than September 1, 1973, to the U.S. Organizing Committee at the following address: Albert N. Bove, Secretary, Organizing Committee for the 3rd ISRM Congress, U.S. National Committee for Rock Mechanics, National Academy of Sciences, 2101 Constitution Avenue N.W., Washington, D.C. 20418.

Accepted papers will be returned to authors along with more complete instructions and preprinted format sheets for final typing for photo-offset printing. All approved papers must reach the Organizing Committee in final form by December 1, 1973.

SECTION ABSTRACT HIGHLIGHTS

If you haven't had a chance to read all of the abstracts for each sectional meeting, the following titles have been suggested by division members:

CORDILLERAN SECTION

- An Analysis of the Regional Geophysical Data in the Holbrook Basin Area, Arizona, Carlos L. V. Aiken and John S. Sumner, p. 2.
- Correlation of Columbia River Basalt by Geophysical Techniques, Jay V. Anderson, John H. Bush, James W. Crosby III, James P. Kiestler, and Barbara A. Siems, p. 3.
- Urban Geology, Western Washington—A State-of-the-Art Review, Ernest R. Artim and Mackey Smith, p. 5.
- Earth Resources Information: Organization or Chaos, Richard W. Berry and Louis I. Briggs, p. 10.
- Land-Use Zoning Along San Andreas Fault, Portola Valley, California, Jon C. Cummings, p. 31.
- Permafrost-Related Engineering Problems and the Trans-Alaska Pipeline, Oscar J. Ferrians, Jr. and Reuben Kachadoorian, p. 41.
- Environmental Hazards of the Northern Santa Barbara Shelf, California, Peter J. Fischer, p. 42.
- Environmental Geology Program for Reno-Sparks, Nevada, Kenneth V. Luza, E. C. Bingler, and H. F. Bonham, Jr., p. 76.
- Impact of Environmental Geologic Study on the Selection and Evaluation of Waste Disposal Sites, Lake Tahoe Area, Robert A. Matthews, p. 78.
- Socio-Geologic Problems of Landsliding in an Older Developed Area of Los Angeles, California, Martin L. Stout, p. 111.

NORTHEASTERN SECTION

- Hydrogeology of a Sanitary Landfill in Glacial Drift in Eastern Connecticut, Lawrence Chestnut, Jr. and Thomas L. Holzer, p. 146.
- Geologic Constraint Maps for Planning Purposes in the Piedmont of Maryland, Emery T. Cleaves and Andrew E. Godfrey, p. 148.
- A Flexible Computer-Based System for the Storage of Geologic Field Data, Peter P. David, p. 154.
- A Possible Model for Teaching Environmental Geology—A New Environmental Course in Allegheny and Westmoreland Counties, Pennsylvania, Jack Donahue and Steven F. Dodin, p. 155.
- Residential Land-Use Planning in Eastern Connecticut Based on Hydrogeology, Thomas L. Holzer, p. 179.
- Geology for Land-Use Planning in York County, Pennsylvania, Mary E. Horne, p. 179.
- A Geoscience Technology Program at the Bachelor's Level, Richard L. Kroll, p. 185.
- Engineering and Related Physical Properties of Some Salt-Marsh Sediments in McIntosh Co., Georgia, Jeffrey W. Pferd, p. 207.
- The Use of a High-Precision Gravity Survey to Map Bedrock, John R. Sumner, p. 224.
- The Geologic Framework of Inner New York Bight—Its Influence on Positioning Offshore Engineering Structures, S. Jeffers Williams, p. 239.

SOUTH-CENTRAL SECTION

- Communications Gap: The Geologic Subsystem of the Physical System, Robert Annan Cook, p. 252.
- Environmental and Land Use Significance of Fractured Carbonate Rocks—Northwest Arkansas, Bradford C. Hanson, p. 261.
- Engineering Geology—Basis for Land Use Management, Christopher C. Mathewson, p. 271.
- Graduate Symposia-Teaching for Communication, Christopher C. Mathewson, p. 272.

NORTH-CENTRAL SECTION

- Geotechnical Considerations in Construction at Fargo, North Dakota, B. Michael Arndt and Stephen R. Moran, p. 294.

- A Geotechnical Engineering Index, Raymond E. Aufmuth, p. 294.
- Indiana's Abandoned Quarries and the Environment, Curtis H. Ault, p. 295.
- A Geophysical Study of the Ste. Genevieve Fault Zone, Marcia B. Brink and Richard W. Davis, p. 303.
- Geophysical Investigations on Clay Deposits in Sink Holes, R. A. Frohlich, A. N. Silverman and G. P. Smith, p. 316.
- Urban and Engineering Problems of Glacial Lake Areas in Southern Indiana, Henry H. Gray, p. 317.
- Multispectral Analysis and Flood Mapping in Iowa, Bernard E. Hoyer and James V. Tarenik, p. 323.
- Landslide Phenomena near Darjeeling, West Bengal, India, Nagaraja S. Kirumekki, p. 326.
- Geochemical Survey of Missouri—Methods and Goals, Alfred T. Miesch and Jon J. Connor, p. 337.
- A Geohydrologic Model for Disposal Site Evaluation, L.V.A. Sandlein and R. C. Palmquist, p. 350.
- Kansas City's Future is Tied to its Unique Subsurface Laboratory, Truman P. Stauffer, Sr., p. 353.
- Urban Geological Zoning in the Greater Liege Area, F. K. Szucs, p. 355.

SOUTHEASTERN SECTION

- Environmental Geology and Land Management, L. Frank Brown, p. 381.
- Environmental Geology of the Northwestern Portion of the Potlatch Quadrangle, Washington, Robert J. Carson, p. 384.
- Colluvium: A Geologic Hazard in the Southeast, B. Roger Carter, p. 385.
- National Program of Inspection of Oams, Charles F. Corns, p. 391.
- Refuse Oams, William E. Davies, p. 392.
- Industrial Disposal Wells in the Southeastern United States, Serge Gonzales, p. 400.
- Mineral Sources of Water in Evaporite Sequences, Otto C. Kopp and Susan M. Fellis, p. 410.
- Geologic and Hydrologic Investigations for a Radioactive Waste Pilot Plant Repository in Rock Salt, Thomas F. Lomenick, p. 413.
- The Geologist and Sanitary Landfills—A Challenge and Responsibility, Stuart W. Maher and Robert A. Miller, p. 415.
- The Chemistry of Cavernous Limestones, Berlen C. Moneymaker, p. 421.
- Prevention of Ground-Water Contamination, D. R. Rima, p. 428.
- Geophysical Survey of a Power Plant Site, William P. Staub and Verner C. Johnson, p. 436.
- The Role of Seismic Station CHC in Earthquake Research in Southeastern United States, David M. Stewart, p. 438.

ROCKY MOUNTAIN SECTION

- Urban Geological Problems of Boulder, Colorado, Victor R. Baker and James A. Pendleton, p. 462.
- Land-Use Mapping of the Front Range Corridor, Linda B. Driscoll, p. 477.
- Geologic Problems Related to Urbanization in the Front Range Urban Corridor, Colorado, Wallace R. Hansen, p. 483.
- Geologic Evaluation of Solid Waste Disposal Siting in the Windsor Study Area, Ronald Martens, p. 495.
- Petrofabrics and Urban Sprawl—Use of a Geological Technique to Depict Demographic Data, John C. Reed, Jr. and Bruce Bryant, p. 505.
- Planning and Implementation of the Windsor Environmental Geology Project, John W. Rold, p. 506.
- Quaternary Stratigraphy, Soils and Land-Use Evaluations of the East-Lake Quadrangle, Adams County, Colorado, Stephen D. Schwochow, p. 510.
- Preparing Preliminary Land-Use Planning Maps with a False-Color Densitometer, William J. Stone, p. 517.

UNDERGROUND WASTE MANAGEMENT AND ENVIRONMENTAL IMPLICATIONS, 1972, AAPG Memoir 18, edited by T. O. Cook, American Association of Petroleum Geologists, Tulsa, Oklahoma, 412 p., \$25.00; \$20.00 to AAPG and SEPM members.

Required reading for everyone concerned with planning, development, and regulation of waste disposal by deep injection wells or other underground means. Memoir 18 is the proceedings of a symposium held in Houston, Texas, in December 1971, which was sponsored by the AAPG and the U.S. Geological Survey. The volume contains 37 papers with discussions presented by professionals from academic, industrial, and governmental agencies, and is primarily concerned with deep well disposal techniques and effects on the underground regime (which may reach the surface), but also contains a few significant (and controversial) discussions on disposal of radioactive waste in underground caverns.

The following titles illustrate the broad range of papers included covering waste disposal problems, well technology, geologic and hydrologic factors, environmental effects, and legal implications: "Basic Disposal-Well Design," "Pretreatment of Industrial Waste Waters for Subsurface Injection," "Geometry of Sandstone Reservoir Bodies," "Mechanical and Chemical Effects of Pore Fluids on Rock Properties," "Natural and Induced Fracture Orientation," "Earthquakes and Fluid Injection," "Liability for Harm from Underground Waste Disposal," and "Regulation of Subsurface Disposal in Texas." —J.C.G.

GEOLOGIC HAZARDS IN MORGAN COUNTY WITH APPLICATIONS TO PLANNING, 1972, B. N. Kaliser, Utah Geological and Mineralogical Survey, 103 Utah Geological Survey Building, University of Utah, Salt Lake City, Utah 84112, Bulletin 93, 56 p., \$2.50.

In terms which are readily understandable to the layman, the author outlines the geologic hazards of Morgan County, Utah. The report is directed toward residential developers and individuals who are searching for a suitable home site. One particular phenomenon which is often overlooked or ignored by the homeowner is the probability of damage due to flash floods. In sparsely vegetated areas where heavy rainfall all of short duration can occur, flooding coupled with erosion potential of soils and deposition of debris on valley flats must be considered.

Topics covered in addition to flooding and erosion potential include bedrock geology, slope stability, earthquake effects, expansive soils, frost heave, settlement, and health hazards. Two plates and two appendices are also included in the report. The plates, both numbered Plate 1, show the engineering geology of Morgan County with emphasis on landslides. One of the plates is colored pink to highlight the locations of landslides and particularly hazardous bedrock types. Appendix I is a series of topographic map sections of the county which show the known and suspected landslides in more detail. Appendix II is a brief description of the soil parameters measured on the few soil samples obtained during the course of the study. —G.E.W.L.

PROCEEDINGS—NORTH AMERICAN RAPID EXCAVATION AND TUNNELING CONFERENCE, 1972, edited by Kenneth S. Lane and Larry A. Gerfield, Vol. 1 and 2, AIME, New York, 1664 p.

The two volumes contain 88 papers presented at the Chicago Conference in June 1972, with an interesting and informative variety of topics on tunneling including: "Geologic Prediction—The Problem, Case Histories, and Geophysics," "Soft Ground Tunneling," "Design of Underground Openings," "Rock Tunnel Test Sections," "Owner-Engineer-Contractor Relationships," "Mechanical Excavation," and "Environmental Controls." These highly worthwhile volumes contain a useful summary of current problems and methods in tunnel exploration, design, and construction. —J.C.G.

ENGINEERING CHARACTERISTICS OF THE ROCKS OF PENNSYLVANIA, 1972, William G. McGlade, Alan R. Geyer, and John P. Wilshusen, *Pennsylvania Geological Survey Bulletin EG-1*, 200 p., \$2.50.

The publication outlines generalized engineering, hydrologic, and geologic characteristics of the rocks of Pennsylvania related to engineering and construction projects and land usage. Information presented for each rock formation shown on the Geologic Map of Pennsylvania includes: lithology, bedding, fracturing, weathering, topography, drainage, porosity, ground water, ease of excavation, cut-slope stability, foundation stability, construction materials, and limited rock test data for selected formations.

Although generalized for formations which often have considerable variations both laterally and vertically over the area included on the state map, as well as on a much smaller scale, the descriptions of rock types and associated features which might be expected for a formation are useful, particularly for newcomers or others unfamiliar with the geology in an area. As the authors note, the descriptions should not replace detailed local on-site investigations. Extreme caution should also be exercised in the use of the rock test data presented, for as the authors point out, the tests are mainly on intact core samples and may or may not be representative of the rock mass. Also, testing conditions vary considerably from one organization to another. (It is the reviewer's experience that often the most important portion of rock in a situation is not or cannot be sampled and tested without great difficulty, time, and expense; for example, the thin clay seam in an otherwise massive limestone bed which may control the slope stability is washed away in test drilling.) One item that should be included in the section on foundation stability for certain formations is the problem associated with expansion of weathering iron sulfide minerals upon exposure in excavations.

The authors have undertaken a difficult and complex task in preparing the summary of rock engineering characteristics and are encouraged to supplement and refine the data as it becomes available from engineering projects, and to publish it in a similar readily useable form. —J.C.G.

PENROSE CONFERENCE PROPOSALS

Members are reminded that proposals for Penrose Conferences will be welcomed by the Society. Guidelines for submissions have been sent to all members; additional copies are available from the Executive Secretary, The Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301.

Closing dates for the semi-annual consideration of proposals are March 1 and September 1.

CASE HISTORY #9 AVAILABLE

Number 9 in the Engineering Geology Case Histories Series, *Geological Factors in Rapid Excavation*, is now available. Our thanks to Howard Pincus, who edited the publication. Contributions in it are by Vinton Bacon, M. Friedman, Richard Hamburger, George E. Heim, Takeshi Iwasaki, Stanley A. Kling, Dennis Lachel, John Logan, Leonard A. Obert, Joseph M. Pugliese, Carl H. Roach, George M. Sowers, and James R. Swaisgood.

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Ernest Dobrovlny	1973-75
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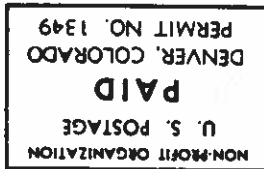
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