



THE
GEOLOGICAL SOCIETY
OF AMERICA

The Engineering Geologist

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

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Chairman's Message

The underlying cause of environmental problems appears to be excessive population, and the population problem does not appear likely to dissipate in the next several generations. Therefore, Society as a whole must be in a position to deal responsibly with urban and suburban growth, power generation, resource development, and waste disposal. The real solution to environmental problems is not preservation of conditions as they are, nor it is simply to clean up the intolerable messes that were created by human ignorance of or indifference to natural system processes. Something more is needed to solve the problem because the solution must accommodate growth until the growth can be controlled. I believe that basic education is the key element in the solution to environmental problems, and engineering geologists can play a critical role in the education process. So this is a call to all engineering geologists: Go educate the public about geologic aspects of environmental problems and the problems will go away. But, of course, it is not that simple.

This idealistic call leads me to the story of the Grasshopper and the Owl which goes something like this: One cold, gray day in late autumn the Grasshopper, who had given no thought to how he would survive through the winter, was shivering in a cold wind as snow began to fall. The Grasshopper was rather smart and had lived through the summer and early fall in grand style. He took whatever he felt like taking with never a thought that the abundant leaves and stems he was enjoying might not last forever. The cold wind and blowing snow gave him a startling view of the reality that the green leaves of summer were, indeed, brown bits of dry, broken waste. What to do now, now that it was cold and he had nothing to eat!

The Owl! Everyone knew the Owl was the wisest of all the animals. He would visit the Owl and ask for advice. So the Grasshopper set out to find the Owl, and when he finally found him, he asked,

"Mr. Owl, everyone knows you are the wisest of all the animals; I need your advice."

"Well, Grasshopper, I can see that your situation it requires

some appropriate action. What is it that you would like to ask?", the Owl said.

"Mr. Owl, here it is late autumn and I have made no plans for the winter. I am already cold and hungry. What should I do?", pleaded the Grasshopper.

"That's simple!", replied the Owl. "Change yourself into a bear and hibernate for the winter."

"What a wonderful idea!", responded the Grasshopper. "That way, I won't have to do anything except sleep in a nice dry cave all winter. What a great idea, Mr. Owl, thanks!"

And with that, the Grasshopper turned away from the Owl and began to look for a suitable cave. But reality descended upon the Grasshopper before he had taken more than a few shivering steps.

"Wait a minute!", cried the Grasshopper, as he turned back to the wide-eyed Owl. "How am I supposed to do that? How do I change myself into a bear?"

"Hold it! Hold it!", replied the Owl firmly, holding up the ends of his wings as though they were palms of outstretched hands. "I just make policy; I don't implement it."

In this fable, the Owl could be viewed as federally or locally promulgated environmental regulations; well-meaning, but sometimes not totally practical or even possible. The Grasshopper clearly is Society; unaware of the gravity of the situation until it is almost too late to do anything except try to figure out how to change a grasshopper into a bear.

Back to the idea of basic education and the role of engineering geologists. More, much more, needs to be understood about natural systems and their response to human perturbations upon them. A basic understanding that trapping sediment at the mouths of canyons causes beach erosion is essential in formulating a plan to protect foolishly located houses from debris flow damage. Sediment catch basins can protect the houses, but the basins do require maintenance and the beach erosion can result in damage many times greater than if the sediment had been allowed to pass through the community. Past EGD Chairman Chris Mathewson defines engineering geology as the study of the constituents of the earth and its processes and the consequences of human interaction. Since the houses near the mountains, engineered river channels constructed to convey flood flows through communities, and groins constructed to control beach erosion are all part of the human component of the

geologic system in this example, thorough understanding of the system and system response must incorporate the human elements. Hence, I believe it is engineering geology.

Some would suggest that what I have described is environmental engineering. Past EGD Chairman Allen Hatheway solicited comments on the relationship of engineering geology to environmental geology; no consensus existed at that time and I doubt one exists now. My personal view of the two terms is that engineering geology attempts to quantify natural processes and materials such that they can be used in design of a safe, economical, and environmentally compatible development. Environmental geology tends to focus on potential impacts that a facility might have on the natural processes and materials surrounding it. Considering these descriptions, so-called environmental geology is subsumed in engineering geology.

Engineering geologists should be involved in education of the general public, governmental representatives, environmental activists, developers, and all other factions of Society. Junior High School classes in earth science are being taught the hardness of quartz and the chemical formulae of the various feldspars. They are not learning that the titanium alloy in the mountain bike they like to ride comes from a mine, and that the ore is processed at a mill and once the titanium is recovered, the waste material must be discharged in a tailings disposal area. Nor are they learning that houses built on landslides can be destroyed, and that landslides can be recognized so that either houses are not built on them or homebuyers who are aware of the risk of damage to houses on landslides will not buy them. Engineering geologists can play a major role in education by offering to give a guest lecture at a Junior High School or High School once each semester describing how much Society really depends on geology. An additional contribution of the engineering geology profession to secondary education would be a well-prepared video tape describing the general aspects of the contribution of engineering geology to environmentally responsible resource development, socially appropriate hazard management, and safe long-term waste disposal. Perhaps this message is also a call for a collective effort from the membership of the Engineering Geology Division to identify appropriate topics and case histories for such a video tape. Comments and suggestions regarding this Chairman's Message are encouraged.

*Jeffrey R. Keaton, Chairman
Engineering Geology Division*

EGD LUNCHEON

Don't forget to buy your tickets to the EGD luncheon on Monday, October 29th with your pre-registration (Dallas). Call GSA Headquarters if you have pre-registered and not ordered your tickets. The cut-off time for a "head count" is 72 hours before the luncheon - Friday morning, October 26th! Plan to be there!

EVENTS of the FUTURE

SAN DIEGO GSA MEETING

OCTOBER 21-24 1991

Two field trips of interest to members of the Engineering Geology Division are being planned for the San Diego meeting. One is to study large landslides in crystalline terrain in the desert, and the second is to investigate various aspects of engineering geology and urban geology of San Diego and vicinity.

The theme of the meeting in San Diego will be "Global Perspective" and the Division is looking for suggestions from members of the Division for Theme sessions. Traditionally the Division has sponsored a symposium and suggestions for the subject of symposium will be welcomed. Please send suggestions to:

Charles W. Welby
Department MEAS
Box 8208
North Carolina State University
Raleigh, NC 27695.

Although the deadline for submission of proposed theme sessions and symposia titles is in December, it will be helpful if they are in hand prior to the management board meeting in Dallas.

EIGHTH THEMATIC CONFERENCE GEOLOGIC REMOTE SENSING

EXPLORATION, ENGINEERING, AND ENVIRONMENT

29 April-2 May 1991 Denver, Colorado, USA
Call for Papers

You are invited to attend the Eighth Thematic Conference and to visit the "Mile-High City" of Denver. This conference primarily focuses on geologic remote sensing, with special emphasis on mineral and hydrocarbon exploration, engineering and environmental applications. The program is designed to benefit both small, independent operators and large corporate users of remote sensing; it will be composed of more than 200 technical presentations by

experts from more than 30 countries. The program treats all aspects of geological remote sensing, from fundamental principles and techniques to advanced data processing and geological interpretation, to provide an effective learning experience for all attendees. From the professional standpoint, this will definitely be one meeting you cannot afford to miss.

The conference will include an industry-oriented technical program of both plenary sessions and poster presentations, hands-on workshops, field trips, exhibits program, student program, employment referral service, and guest and hospitality programs. Plenary and poster sessions are being organized by an international program committee to address the following topics:

- Spectral Geology
- Engineering and Environmental Site Characterization
 - Structural and Stratigraphic Applications
 - Airborne Methods
 - Geologic Hazards
- Radar Systems and Applications
- Photogeology and Image Interpretation
- New Sensors and Emerging Technologies
 - Exploration in Mature Basins
 - Low-Cost Remote Sensing
- Frontier/International Exploration
 - Image Processing and Analysis
 - Energy and Mineral Exploration
- Data Integration and Geographic Information
 - Geobotanical Techniques Systems
- Remote Sensing in the Marine Environment
 - Case Histories
 - Hydrology

Submit a summary of no less than 200 and no more than 500 words (no figures or references) prior to 1 October 1990. State the problem addressed, methodology used, results, and conclusions. Specify if you are interested in having your paper peer-reviewed for possible publication in the September 1991 special issue of the journal, *Photogrammetric Engineering and Remote Sensing*. Author's kit will be sent in November 1990. Final papers will be due on 15 February 1991 for inclusion in the proceedings and for peer-review. Proceedings will be distributed at the conference.

- Summary Due: 1 October 1990
- Author Notification: November 1990
- Camera-ready Paper Due: 15 February 1991

Direct your summaries and questions on the technical program to Dr. Robert H. Rogers or, for more information on registration and the exhibits program, please contact Nancy J. Wallman:

ERIM/Thematic Conferences

P. O. Box 8618

Ann Arbor MI 48107-8618

Phone: 313/994-1200 x3234 (FAX 313/994-0944)

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THE HERITAGE OF ENGINEERING GEOLOGY

DNAG VOLUME-GSA. Published 1990

Early planning for development of a Centennial volume on Engineering Geology was undertaken by Division Management Board in 1980-81 with two volumes planned: a *History of Engineering Geology*, and a sequel with *State-of-the-Art* papers. These plans were modified by 1983 for one volume; an outline was prepared by April 1984 and received approval of DNAG Steering Committee in November 1984. With minimal action and further delays in 1985, Division chairman, D. M. Cruden appointed George A. Kiersch as editor-in-charge of volume in November 1985. Unfortunately the three-year delay became a cause for manuscript delays into 1988-89, and several important topics originally planned had to be dropped.

The volume is not intended to be another textbook. Instead, it is a review of historical changes in Engineering Geology (theory and practice) through time. The rationale for subject coverage on History, Geological Processes, Natural Materials, Investigations for Engineering Works, and the Geologist's Responsibilities in Litigation has included the overview question: "How have the efforts of geologists for engineering works resulted in a new technical knowledge and advances in the geosciences?" Obviously, each area or subject does not offer equal possibilities for citing such advances.

The volume of 25 chapters by 35 contributing authors approaches 600 pages of text, graphics, and supporting materials.

CENTENNIAL SPECIAL VOLUME 3 THE HERITAGE OF ENGINEERING GEOLOGY: THE FIRST HUNDRED YEARS 1888-1988

Editor

George A. Kiersch

Professor Emeritus, Geological Sciences
Cornell University, Snee Hall
Ithaca, New York 14853

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PART I

History and Professional Development of Engineering Geology
Chapter 1 - Heritage of Engineering Geology, Changes
Through Time

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**BIOGRAPHICAL SKETCHES
NOMINEES FOR
1990-91
ENGINEERING GEOLOGY DIVISION OFFICERS**

**PERRY H. RAHN, CHAIRMAN
CHARLES W. WELBY, CHAIRMAN-ELECT
JEROME V. DEGRAFF, SECRETARY-TREASURER
RHEA LYDIA GRAHAM, MEMBER-AT-LARGE**

For Chairman 1990-91

Perry H. Rahn was born in Allentown PA. He received his BS degree in Civil Engineering and BA degree in Geology from Lafayette College in 1959 and his Ph.D. from 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, Bucknell University, and Argonne National Laboratory. In 1986, he published a textbook, *Engineering Geology: an Environmental Approach*. He is a Professional Engineer and 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 57701.

Chairman-Elect

Charles W. Welby was born in 1926 and grew up in Taft, CA. He received his BS degree in Economic Geology in 1948 and his MS degree in Geology in 1949 from the University of California at Berkeley and his Ph.D. degree in Geology from Massachusetts Institute of Technology in 1952. After two years with the California (1952-54), he began his teaching career at Middlebury College, VT (1954-58), then Trinity College, CT, (1958-61), Rensselaer Polytechnic Institute, NY, (1961-62), University of Southern Mississippi (1962-65), and has been at North Carolina State University since 1965. He has acted as consulting geologist on a variety of projects chiefly related to ground water and dam failures. He is a member of the Association of Engineering Geologists, American Institute of Geologists, Society of Economic Paleontologists and Mineralogists and National Water Well Association. He has served as an Editor of the Journal of Ground Water, is Chairman of the AEG Ground Water Committee and Chairman of the American Water Resources Association Publications Committee. His research interests include ground water and urban runoff studies as related to land-use planning, contaminant movement in ground water in the Piedmont Province and application of remote sensing technology to mass wasting problems. His current address is: Department of Marine, Earth and Atmospheric Sciences, Box 8208, North Carolina State University, Raleigh, NC, 29695.

For Secretary-Treasurer, 1990-1991

Jerome V. DeGraff was born in 1945 in Canadagua NY. He received his BS degree in Education (Earth Science) from the State University of New York (Geneseo) in 1967 and his MS in geology from Utah State University in 1976. He is a Forest Geologist with the USDA Forest Service in Fresno CA. He served on National Forests in Utah prior to transferring to California. In recent years, he has completed several official missions as a landslide hazard specialist to countries in the Caribbean and Asia. He is currently a member of the Engineering Geology Committee of the Transportation Research Board and Chairperson of the Committee on Landslides of the Association of Engineering Geologists, International Association of Engineering Geology and International Society for the Prevention and Mitigation of Natural Hazards, among others. He co-authored the textbook, *Principles of Engineering Geology*. His research interests included studies of landslides, especially regional hazard zonation, geologic processes and land use and quantitative analysis techniques. His current address is: Sierra National Forest, Federal Bldg., Room 3017, 1130 "O" Street, Fresno CA, 93721.

For Member-at-Large, 1990-1991

Rhea Lydia Graham was born in 1952 in Terre Haute IN. She received an A.B. Geology at Bryn Mawr College in 1974, an MA in Oceanography at Oregon State University 1977. A Registered Geologist and Engineering Geologist in Oregon, she is also a Registered Environmental Assessor in the State of California, and a Certified Professional Geologist in Indiana. Her current employment is as a senior scientist with Science Applications Intl. Corp. (1988-present). Other positions she has held include Regulatory Compliance Specialist, Ponderosa Products, Inc., and private consultant in RCRA Compliance 1988; Manager, Environmental Sciences, DEUEL & Assoc. in 1987-1988; Senior Engineering Geologist, DEUEL & Associates, 1985-1987 in Albuquerque, NM. She has worked as Geologist, Forestry Sciences Laboratory and Private Consultant in Engineering Geology from 1983-1984 in Corvallis OR; as an Engineering Geologist for CH2M Hill (1977-78) in Houston TX. Her professional society memberships include Member of Geological Society of America, Association of Engineering Geologists, New Mexico Geological Society and AIPG. She is a Past-President of the New Mexico Section of AIPG and has served on the NRC/NAS Committee on Ground Failure Hazards.

SCHEDULE OF PRESENTATIONS FOR THE GSA ENGINEERING GEOLOGY DIVISION SYMPOSIUM

TECTONICS IN THE MID-CONTINENT

DCC, W 105-106, 8:00 A.M.

NORMAN R. TILFORD, PRESIDING

INTRODUCTION 8:00 A

Jer-Ming Chiu*, Kou-Cheng Chen, Young-Tun Yang, Arch Johnston:

A High Resolution Panda Experiment in the Central New Madrid Seismic Zone (004294) 8:05 A

G. A. Bollinger*, M.S. Sibol, A. C. Johnston:

The Eastern Tennessee Seismic Zone--Largest and Most Active in the Southeastern United States (106220) 8:30 A

Hasan Cetin* *The Northwest Extension of the Meers Fault, Oklahoma* (004286) 8:55 A

Charles B. Snell*: *Implications of Geomorphic Studies on Contemporaneous Deformation of the Wichita Uplift and the Meers Fault, Southwest Oklahoma* (004293) 9:20 A

COFFEE BREAK 9:45 A

F. H. Swan*, K. I. Kelson: *Segmentation of the Meers-Duncan-Criner Fault Zone, Oklahoma: Implications to Active Tectonics in the Mid-Continent* (011423) 10:15 A

Norman R. Tilford*: *Meers Faults, Oklahoma Segmented, Slow Deformation?* (004295) 10:40 A

Meridee Jones-Cecil*: *Ground-Magnetic Profiles Across the Meers Fault, S.W. Oklahoma: Quaternary Reactivation of a Late Paleozoic Fault Zone* (005887) 11:05 A

George W. Shurr*, Ivan W. Watkins, Mary K. Tozer: *Neotectonism on Lithosphere Block Boundaries in the Northern Midcontinent: Minnesota and South Dakota* (011421) 11:30 A

ENVIRONMENTAL GEOLOGY (POSTERS)

DCC, West Hall, 8:00 a.m.-12:00 noon

Authors will be present from 9-11:00 a.m.

A. M. Blount*: *Trace Mineral Analysis to Determine Compliance with Federal Standards* (003734) Booth 1

Belinda K. Price*: *A Comparison of Subsurface Investigation Techniques for Determining Subsurface Lithology in Unconsolidated Sands and Gravels* (013996) Booth 2

Sheri M. George*: *Geologic Interpretations of Richton Salt Dome: A Proposed Nuclear Waste Repository Site* (023630) Booth 3

Y. T. John Kwong*: *Degradation of Permafrost Along the Mackenzie Highway: Causes and Effects* (014679) Booth 4

Rona J. Donahoe*, Chang-rui Gong, Jacques L. Chasse: *Physicochemical Interactions Between Treated Municipal Waste Effluent and Silty Loam Soil* (023651) Booth 5

Lindgren L. Chyi*, Lung-Ho Lin: *Analysis of Factors Affecting Radon Levels Inside a House* (024028) Booth 6

E. L. Schrader*, B. L. Clark: *Purification of Groundwaters Contaminated with Organic Acids: Chemical Partitioning onto Quaternary Amine Modified Bentonites* (026391) Booth 7

James A. Harrell*, John P. McKenna, C. E. Chrosniak: *Geological Controls on Indoor Radon in Ohio* (031851) Booth 8

C. E. Brown*, D. G. Mose, G. W. Mushrush, C. E. Chrosniak: *Nonparametric Statistical Tests to Assess the Radon Potential of Rocks in Parts of Virginia and Maryland* (023680) Booth 9

J. A. Fallin*: *Hazardous Waste and Other Contaminant Migration Through Saturated Paleochannel Deposits under High Plains Superfund Sites and Other Locales* (027508) Booth 10

Adam R. Hutter*, Herbert W. Feely: *Long-Term Measurements of Radon and Thoron in Soil Gas* (004845) Booth 11

ENGINEERING GEOLOGY (POSTERS)

DCC, West Hall, 8:00 a.m.- 12 noon

Authors will be present from 9-11:00 a.m.

Tim J. Vogt*, William J. Boyle: *Structural Analysis of Mount Rushmore National Memorial* (013480) Booth 1

R. Lee Dooley*: *Ground Cracks Associated with the October 17, 1989 Loma Prieta Earthquake, Hecker Pass Highway, Santa Clara County California* (014822) Booth 2

ENVIRONMENTAL GEOLOGY

DCC, W Blrm C. 1:30 p.m.

TERRY WEST AND WILLIAM C. HANEBERG, PRESIDING

Ben K. Knape* : <i>The Texas Water Commission's Regulatory Program for Disposal of Solidified Hazardous Waste in Engineered Salt Caverns</i> (005095)	1:30 P
Ray E. Ferrell, Jr.* : <i>Clays as Barriers to Radioactive and Industrial Waste Migration in the Subsurface</i> (005978)	1:45 P
Mary L. Podsednik* : <i>Geologic Assessment of Radon-222 in McLennan County, Texas</i> (011275)	2:00 P
Daniel J. Greeman*, Arthur W. Rose, William A. Jester : <i>Geochemical Dynamics of Radon Precursors in Eastern U. S. Soils</i> (019414)	2:15 P
Wayne C. Isphording*, Robert J. Beyers, Burke L. Brown, R. Bradford Jackson : <i>Geochemistry of a Man-Induced Oligotrophic Reservoir</i> (013007)	2:30 P
David R. McQueen* : <i>Grout Integrity in Ground Water Monitoring Wells in Northeast Louisiana: A Field Study of One Contamination Pathway at Regulated Facilities</i> (014631)	2:45 P
Donn S. Gorsline* : <i>Expansion of Bottom Water Anoxia in Santa Monica Basin, California Borderland Over the Past Two Centuries</i> (015098)	3:00 P
Richard R. Parizek, Weixing Guo* : <i>Temperature Indication of Pyrite Oxidation in Mine Spoil and the Effect of Sewage Sludge Treatment</i> (019408)	3:15 P
J. R. Miller*, D. F. Ritter, R. C. Kochel : <i>Channel Avulsion in Downcutting, Anastomosing Streams in South-Central Indiana Environmental Implications</i> (021006)	3:30 P

ENGINEERING GEOLOGY

DCC, W blrm C. 3:45 p.m.

TERRY WEST AND WILLIAM C. HANEBERG, PRESIDING

John W. Williams* : <i>Engineering Geology in U. S. Colleges and Universities -- Status of Programs, Course offerings, Faculty and Estimates of the Future</i> (007836)	3:45 P
Ali A. Nowroozi* : <i>Intensity-Magnitude Relations for the Southeastern United States Earthquakes</i> (01055)	4:00 P
James T. Neal*, Don W. Whittington : <i>Site Characterization for the U. S. Strategic Petroleum Reserve</i> (005092)	4:15 P
Joseph D. Martinez* : <i>Benefits and Hazards of Salt Dome Utilization</i> (005082)	4:30 P
L. Paul Knauth*, Sarah Kealy Roberts : <i>Use of Stable Isotopes and Chemical Analyses to Determine Brine Sources in Salt Domes: Progress and Problems</i> (021298)	4:45 P
William C. Haneberg* : <i>Draping and Differential Compaction of Compressible Elastic Soil Layers Under the Influence of Gravity</i> (021140)	5:00 P
T. R. West*, M. F. Brifcani : <i>Predicting Subsidence Effects from Underground Coal Mining in Southwest Indiana: Engineering Geology/Hydrogeology Implications</i> (020664)	5:15 P

T 9. ENGINEERING GEOLOGY: ENVIRONMENTAL AND ENGINEERING STUDIES FOR RADIOACTIVE WASTE ISOLATION: EXPERIENCE BASED ON THE WASTE ISOLATION PILOT PLANT (WIPP) PROJECT, S.E. NEW MEXICO

DCC, W 116, 3:15 p.m.

WILLIAM M. ROGGENTHEN, DWIGHT DEAL, AND A. L. LAPPIN, PRESIDING

Robert Evans* : <i>The Use of Evaporites as Containers for the Disposal of Dangerous Waste: Environmental Scientific and Philosophical Concerns</i> (004892)	3:15 P
M. Kannenberg*, C. Francke, W. Roggenthen : <i>Ground Probing Studies of the Waste Isolation Pilot Plant (WIPP) Underground</i> (005202)	3:45 P
D. Deal*, W. Roggenthen : <i>Evolution of the Hydrologic System in a Deforming Salt Medium</i> (005205)	3:45 P
L. H. Brush*, D. Grbic-Galic, D. T. Reed, X. Tong, R. H. Vreeland, R. E. Westernman : <i>Preliminary Predictions of Repository Chemistry for the Waste Isolation Pilot Plant</i> (005619)	4:00 P
Peter B. Davies*, Geoff A. Freeze : <i>The Role of Geologic Heterogeneities in Controlling the Flow of Waste-Generated Gas from the WIPP Repository</i> (005207)	4:15 P
David B. Ward, Douglas G. Brookins* : <i>Rb-Sr and Uranium Geochemical Constraints on Actinide Migration at the Waste Isolation Pilot Site, New Mexico</i> (011227)	4:30 P
Malcolm D. Siegel* : <i>A Model for the Chemical Evolution of Groundwater in the Culebra Dolomite: Implications for Radionuclide Transport from the Waste Isolation Pilot Plant (WIPP)</i> (005197)	4:45 P

T 10. ENGINEERING GEOLOGY DIVISION: EFFECTS OF THE LOMA PRIETA EARTHQUAKE

DCC, Theater, 3:00 p.m.

PERRY RAHN AND E. L. KRINITZSKY, PRESIDING

Ellis L. Krinitzsky* : <i>Ground Motion Amplification in Bay Muds: Loma Prieta Earthquake</i> (005178)	3:00 P
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William F. Cole, Patrick O. Shires, Richard P. Lozinsky*, Bruce R. Clark: Preliminary Subsurface Characterization of Earthquake-triggered Landslides in the Central Santa Cruz Mountains, California (011084)	3:15 P
Jeff Cottingham*, J. Michael Cleary, Rick Swanson: Ground Fractures from the Loma Prieta Earthquake: C. T. English Middle School, Santa Cruz Mountains, California (020724)	3:30 P
Daniel J. Ponti*: Off-Fault Surface Fractures Produced by the 1989 Loma Prieta, California, Earthquake: A Significant Hazard for the Santa Cruz Mountains (015283)	3:45 P
J. David Rogers*, Richard C. Wilhelms: Asymmetric Ground Motion and Site Stratigraphy in Vicinity of the Collapsed I-880 Cypress Structure in Oakland During The October 17, 1989 Loma Prieta Quake (005182)	4:00 P
Michael J. Bennett*, Manual G. Bonilla, Thomas L. Holzer: Liquefaction in the Marina District, San Francisco, California, During the Loma Prieta Earthquake (015288)	4:15 P
William R. Dupre*: Geologic Controls on Liquefaction-induced Ground Failure in the Monterey Bay Area, California, During the Loma Prieta Earthquake, October 19, 1989 (008965)	4:30 P
D. J. Buranek, D. A. Cochrane*: Sanitary Landfill Performance During the Loma Prieta Earthquake (07834)	4:45 P

T 24. GEOLOGICAL RESOURCES, HAZARDS AND POPULATION

DCC, W 101-103, 1:00 p.m.

GARRY MCKENZIE AND ALAN V. MOGAN, PRESIDING

Jeffrey S. Walker*, Michael A. Trevits: Abandoned Coal Mine Lands (I): Abandoned Coal Mine Subsidence-Hazards and Remediation Methods (014630)	1:00 P
Karen K. Cohen*, Jeffrey S. Walker, Michael A. Trevits: Abandoned Coal Mine Lands (II): A Seismic Approach to Predicting Underground Mine-Related Subsidence Events in the Pennsylvania Anthracite Fields (004595)	1:15 P
Alan V. Morgan*: Volcano Eldfell, Iceland; 1973-1990, A Seventeen-Year Retrospective (015442)	1:30 P
Jacqueline M. Lloyd*, Ronald W. Hoenstine, Ed Lane, Steven M. Spencer: The Florida Geological Survey's Mineral Resource Investigations and Environmental Geology Program (012822)	1:45 P
Alejandra Cortes*, Roberto Rocha, Ricardo Jaimes, R. N. Farvolden: Field Studies in the Sierra de Las Cruces to Evaluate Recharge to the Valley of Mexico Aquifers (031291)	2:00 P
Kenneth H. Lister*, Bruce Garbaccio: A Resource for Solid Waste Disposal, Southern California (009121)	2:15 P
COFFEE BREAK	2:30 P

Eldon M. Gath*, Paul E. Sanchez: The Safety Element of Los Angeles County and Urban Hazard Reduction (011083)	2:45 P
D. M. Bush*, R. D. Priddy, K. L. Dixon, O. H. Pilkey: Property Damage Mitigation: Coastal Processes Perspective (017986)	3:00 P
Daniel Jean Stanley*: Recent Subsidence and Northeast Tilting of the Nile Delta, Egypt: Serious Implication for a Rapidly Growing Population (010830)	3:15 P
Lonnie G. Thompson*, Ellen Mosley-Thompson, Crystal B. Schaaf, Izumi Shimada: Cultural Impacts of Climatic Change in the Prehistoric Andes (015441)	3:30 P
Garry D. McKenzie*: Conservation of Natural Resources, Environmental Protection, and Reduction of Losses from Geologic Hazards: The Need for an Holistic Approach (006024)	3:45 P
R. N. Farvolden*: Geologic Hazards and a Growing Population, Mexico City (031292)	4:00 P
Otto C. Kopp*: Needed: A National Policy for Environmentally Safe and Cost-Effective Utilization of Coal Combustion By-products (013049)	4:15 P

T 12. METAGEOLOGY: EXPANDING GEOLOGIC AWARENESS (PART I)

DCC, Theater, 8:00 a.m.

RAYMOND PESTRONG AND GARRY MCKENZIE, PRESIDING

C. Gordon Winder*: Ruminations on the Age of the Earth, Creationism, and the Science/Religion Issues (010795)	8:00 A
Kenneth G. Johnson*: Terrain-Fundamental Element in the Course of Human Events (011699)	8:15 A
Murray Felsher*: The B-Berm Approach: Borders, Boundaries, Edges, Rims, and Margins--A Conceptual Methodology for Looking at Rocks, and at Life in General (004769)	8:30 A
Raymond Pestrone*: The Nature of Metageology (005143)	8:45 A
Lawrence Lundgren*: Geologist and Social Scientist: Potential Hazard-Mitigation Collaborators? (011543)	9:00 A

Paul K. Grogger*, Parry Thomas: <i>The Use of Geology to Develop a Natural Feature Aesthetic Classification</i> (012779)	9:15 A
James R. Underwood, Jr.*: <i>Roadside Geologic Signs and Public Awareness: A Case History</i> (017259)	9:30 A
Christopher C. Mathewson*: <i>Philosophy of Professional Registration</i> (011434)	9:45 A

COFFEE BREAK 10:00 A

Eileen L. McLellan*: <i>Earth Resources and Public Policy, or, the Legacy of Gondwanaland</i> (031135)	10:15 A
Cheryl H. Petrina*, Eileen L. McLellan: <i>El Dorado of the Ice? A Tectonic Evaluation of Antarctic Mineral Resource Potential</i> (031132)	10:30 A
Loren A. Raymond*: <i>Geology and Sustainable Development</i> (001220)	10:45 A
Noel Potter, Jr.*: <i>Appalachian Landscapes: An Exhibition of Landscape Paintings Bridges the Arts and Sciences</i> (033076)	11:00 A
Ann H. Murray*: <i>Reclaiming the Land: Art in a Geologic Context</i> (024054)	11:15 A
William D. Romey*: <i>From Picasso and Plate Tectonics to Mondrian, Klee, and the Pixel: Geology-Art Connections</i> (022290)	11:30 A
Russell G. Shepherd*, Beverly N. Ellis: <i>Geotoons: What's Up Roc?</i> (030526)	11:45 A

T 12. METAGEOLOGY: EXPANDING GEOLOGIC AWARENESS (PART II)

DCC, Theater, 1:30 p.m.

RAYMOND PESTRONG AND GARRY MCKENZIE, PRESIDING

Richard L. Cameron*: <i>Ode to a Polar Pilot</i> (010749)	1:30 P
Betty Roszak*: <i>The Crest of the East Pacific Rise</i> (005137)	1:45 P
Kevin McCartney*: <i>By Thought and Dint of Hammering: Geopoetry as a Link Between Art and Geology</i> (014939)	2:00 P
M. Dane Picard*: <i>How Alike Geology and Poetry, How Different</i> (009328)	2:15 P

Continuation of Centennial Special Volume 3
from Page 3

- Antiquity to World War II
- Career of William O. Crosby, Appendix A
"Father of Engineering Geology in North America"

Chapter 2 - Modern Practice, Training, and Academic Endeavors

- The 1940s to 1980sGeorge A. Kirsch

Chapter 3 - Research Efforts, Governments of North America

- U. S. Federal Agencies.....Fitzhugh T. Lee
- Geological Survey of Canada.....John S. Scott
- Developments of Mexico.....Guillermo P. Salas, Marinos Ruiz-Vasquez, and Jorge I. Maycotte

Chapter 4 - History and Heritage of the Engineering Geology Division, Geological Society of America, 1940s

- Heritage - Formative Years 1946-55 - Growth Since 1956
.....George A. Kirsch and Allen W. Hatheway

Chapter 5 - Professional Practice and Societal Organizations

- Engineering Firms and Constructors.....Cole R. McClure and Gail R. Sorrough
- Committee on Engineering Geology of ASCE and EGD/GSA.....Richard E. Gray
- Highway Geology Symposium and Transportation Research Board.....Richard E. Gray
- Association of Engineering Geologists.....Richard Galster

- International Association of Engineering Geologists and U. S. National Committee.....David J. Varnes and George A. Kirsch

PART II, GEOLOGICAL PROCESSES, PHENOMENON AND ENGINEERING WORKS

Chapter 6 - Surface Water and Flooding.....Perry H. Rahn

Chapter 7 - Erosion, Sedimentation, and Fluvial Systems

.....Lawson M. Smith and David M. Patrick

Chapter 8 - Coasts and Beaches.....Stephen P. Leatherman

Chapter 9 - Slope Movements.....Robert W. Fleming and David J. Varnes

Chapter 10 - Nontectonic Subsidence.....Thomas L. Holzer

Chapter 11 - Volcanic Activity.....Donal R. Mullineaux and Robert L. Schuster

Chapter 12 - Faulting and Seismic Activity.....Manuel G. Bonilla

Chapter 13 - Rebound, Relaxation and Uplift.....Thomas C. Nichols, Jr. and Donley S. Collins

Chapter 14 - Permafrost.....Troy R. Pewe

PART III, THE ENVIRONS AND CONSTRUCTION MATERIALS

Chapter 15 - Glacial Deposits.....Donald R. Coates

Chapter 16 - Natural Aggregates.....Katharine Mather and Bryan Mather

Chapter 17 - Snow and Ice.....Wilford F. Weeks and
Robert L. Brown

PART IV, GEOLOGICAL INVESTIGATIONS FOR ENGINEERING WORKS

Chapter 18 - Regional/Areal Reconnaissance and Investigation of Candidate Areas/Sites.....George A. Kiersch

Chapter 19 - Investigation of Preferred Sites for Selection and Design.....John G. Cabrera and Allen W. Hatheway

Chapter 20 - Construction Geology: As-Built Conditions
.....Jeffrey R. Keaton

Chapter 21 - Investigation of Existing Engineering Works and Rehabilitation.....Paul W. Fisher

PART V, FAILURES, ERRORS OF JUDGMENT, LITIGATION AND THE GEOLOGIST'S RESPONSIBILITY

Chapter 22 - Failures of Engineering Works.....Laurence B. James and George A. Kiersch

Chapter 23 - Controversies-Errors of Geologic Judgment and Impact on Engineering Works.....George A. Kiersch and Laurence B. James

Chapter 24 - The Geologist and Legal Responsibilities.....Eugene B. Waggoner and George A. Kiersch

Chapter 25 - Forensic Geosciences for Engineering Works--Litigation, Hearings and Testimony.....James R. Dunn

Contributors (35) - brief sketches available on each.

This rational and short background was contributed
by
George A. Kiersch.

ENGINEERING GEOLOGY PROGRAM BY SCIENTIFIC DISCIPLINES

KEY: I, II, X = Discipline Session Number; P = Posters;
S = Symposium; T = Theme Session (listed under discipline
having the majority of the abstracts).

ARCHEOLOGY: Tuesday, Oct 30, 8 am session, I; 1 pm session, S12.

COAL: Monday, Oct 29, 8am session, S17; 1pm, I; , Wednesday, Oct 31, 8am, P.

COMPUTERS: Tuesday, Oct 30, 8am, P.

ECONOMIC: Sunday, Oct 28, 8am, S1; 1pm S2; Monday, Oct 29, 8am, I; Tuesday, Oct 30, 8am, P; 1 pm, II; Wednesday, Oct 31, 8am, III; Thursday, Nov 1, 1pm, IV.

ENGINEERING: Monday, Oct 29, 8am, S4; 1pm, T9; Tuesday, Oct 30, 8am, P; 1pm, T10; Wednesday, Oct 31, 1pm, I; Thursday, Nov 1, 1pm, T24.

ENVIRONMENTAL: Monday, Oct 29, 8am, P; 1pm, T9; Tuesday, Oct 30, 8am, T12; 1pm, T12; Wednesday, Oct 31, 1pm, I.

EXPERIMENTAL PETROLOGY: Tuesday, Oct 30, 1pm, P; Thursday, Nov 1, 1pm, I.

GEOCHEMISTRY: Sunday, Oct 28, 1pm, S8; Monday, Oct 29, 8am, I, T1; 1pm, II, T18, T21; Tuesday, Oct 30, 8am, IV, S10; 1pm, V, T27, P; Wednesday, Oct 31, 8am, VI; 1pm, VII, VIII; Thursday, Nov 1, 8am, IX, X; 1pm, P.

GEOLOGY EDUCATION: Monday, Oct 29, 1pm, S7; Tuesday, Oct 30, 1pm, P; Wednesday, Oct 31, 8am, T26; 1pm, T26; Thursday, Nov 1, 1pm, I.

GEOMORPHOLOGY: Monday, Oct 29, 8am, P; Tuesday, Oct 30, 8am, I; Thursday, Nov 1, 1 pm, T6.

GEOPHYSICS: Tuesday, Oct 30, 8am, S18; 1pm, I, T20; Wednesday, Oct 31, 8am, P.

GEOSCIENCE INFO: Monday, Oct 29, 8am, S13; Tuesday, Oct 30, 1pm, I, P.

HISTORY: Monday, Oct 29, 8am, S16; Tuesday, Oct 30, 8am, I.

HYDROGEOLOGY: Monday, Oct 29, 8am, T5; 1pm I; Tuesday, Oct 30, 8am, P; Wednesday, Oct 31, 8am, S9; 1pm, S9, T14; Thursday, Nov 1, 8am, II; 1pm, T3.

IGNEOUS PETROLOGY: Tuesday, Oct 30, 1pm, I; Wednesday, Oct 31, 8am, T30; 1pm, II, T30; Thursday, Nov 1, 8am, III; 1pm, P.
MARINE: Tuesday, Oct 30, 1pm, I; Wednesday, Oct 31, 8am, T30; 1pm, II, T30; Thursday, Nov 1, 8am, III; 1pm, P.

METAMORPHIC PETROLOGY: Monday, Oct 29, 8am, I; Tuesday, Oct 30, 8am, II; Wednesday, Oct 31, 8am, III; 1pm, P; Thursday, Nov 1, 1pm, IV.

MICROPALEONTOLOGY: Monday, Oct 29, 1pm, P; Tuesday, Oct 30, 8am, S5; Wednesday, Oct 31, 8am, I.

MINERALOGY/CRYST: Monday, Oct 29, 1pm, S6; Tuesday, Oct 31, 8am, I; 1pm, P.

PAELOCEANOGRAPHY/PALEOCLIMATOLOGY: Monday, Oct 29, 1pm, P; Tuesday, Oct 30, 1 pm, I; Thursday, Nov 1, 1pm, II.

PAELONTOLOGY: Monday, Oct 29, 8am, I; 1pm, II; Tuesday, Oct 30, 8am, S3; Wednesday, Oct 31, 8am, P; 1pm, III, T4, T31; Thursday, Nov 1, 8am, IV, P; 1pm, V.

PETROLEUM: Monday, Oct 29, 8am, P.

PLANETARY: Monday, Oct 29, 1pm, I; Tuesday, Oct 30, 8am, S11; Wednesday, Oct 31, 8am, P.

PRECAMBRIAN: Tuesday, Oct 30, 1pm, T13,P; Wednesday, Oct 31, 1pm, I.

QUATERNARY: Monday, Oct 29, 1pm, I; Tuesday, Oct 30, 8am, T11; 1pm, II; Wednesday, Oct 31, 8am, S9; 1pm, S9,P; Thursday,

Nov 1, 8am, III.

SEDIMENTOLOGY: Monday, Oct 29, 1pm,P; Tuesday, Oct 30, 8am, I; Thursday, Nov 1, 8am, II, III, T8; 1pm, IV.

SEDIMENT PETROLOGY: Monday, Oct 29, 8am,I; 1pm, II; Tuesday, Oct 30, 1pm III; Thursday, Nov 1, 8am, T16,P.

STRATIGRAPHY: Monday, Oct 29, 8am, P; Wednesday, Oct 31, 8am, T17, T19; 1pm, T19; Nov 1, 8am, I; 1pm, II.

STRUCTURAL: Oct 29, 8am, S14; 1pm, I, T22; Oct 30, 8am, II,P; 1pm, III; Oct 31, 8am, IV; 1pm, V, T25.

TECTONICS: Oct 29, 1pm, I, T22; Oct 30, 8am, II; 1pm, T2, T20,P; Oct 31, 8am, III, P; 1pm, IV; Nov 1, 8am, V, P, T23; 1pm, VI.

VOLCANOLOGY: Oct 29, 8am, T31; Oct 30, 1pm, P; Nov 1, 1pm, I.



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