

The Engineering Geologist



THE
GEOLOGICAL SOCIETY
OF AMERICA

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

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CHAIRMAN'S MESSAGE

Dear Colleagues:

I've noticed an annoying trend among college students: many geology students interested in environmental issues tend to shy away from engineering geology. This may be due in part to the misrepresentation (expressed by Gordon Gastil's editorial in the March 1991 *GSA Today*) that engineers are the bad guys and environmentalists the good guys. Some stay clear of anything involving engineering, of course, to avoid math.

We need some young blood in our professions. It's alarming to see many of the GSA annual meeting technical sessions crammed to overflowing, but our Engineering Geology Division sessions poorly attended by the younger set. It's more than disconcerting, it's paradoxical because - ask anybody - the future of geosciences is with us.

What we need to do is align ourselves more with the growing environmental movement. Engineering geologists are, by in large, environmental geologists. We do the same type of things, although engineers are more rigorously quantitative. . . .End of sermon. . .

My tenure as chairman of EGD is coming to an end, and I have appreciated the opportunity to work closely with so many of you. We have many dedicated people working as officers and as committee members, and I thank them for their efforts. I would particularly like to express my appreciation to Rick Giardino as editor of *The Engineering Geologist*, and to Manuel Bonilla as chairman of the Burwell Committee.

I think that this year the Division's greatest accomplishments were the publication of the *The Heritage of Engineering Geology; the First Hundred Years* edited by George Kiersch for

GSA as part of the DNAG series, and the continued support of the Jahns lecturer with the Association of Engineering Geologists.

Our division has a proud history, yet needs constant support from its members. We are always looking for volunteers to help on committees because there are vacancies to be filled.

Engineering geologists can look forward to a great GSA Annual meeting in San Diego. The theme of the meeting is "global perspectives" and, among other things, calls attention to the global extent of environmental degradation. Among the highlights for Engineering Geologists:

Sunday, Oct. 20 - Field Trip: Geologic Hazards of San Diego

Monday, Oct. 21 - Noon EGD Luncheon

Student Award - Kevin Hayes

Burwell Award - Richard Iverson and Jon Major

Distinguished Practise - Beach Leighton

Meritorious Service - Chris Mathewson

New Jahns Lecturer - Barry Voight

Theme Sessions: Urban Geologic Hazards

Failure Mechanisms of Megaslides

Tuesday, Oct. 22 - Technical Session Symposium "Georisk Assessment" - 8 a.m.

Friday/Saturday, October 25-26

Field Trip: Landslides of the Peninsular Range

Hope to see you in San Diego.

Perry H. Rahn

LANDSLIDE TEACHING AIDS

by
D. M. Cruden

The following two sheets have been prepared from an article IAEG Commission on Landslides (D.M. Cruden, chair), 1990, "Suggested Nomenclature for Landslides," *Bulletin of the International Association of Engineering Geologists*, 4:13-16.

The AIEG Commission on Landslides is preparing a Multilingual Landslide Glossary for UNESCO as a contribution to the International Decade for Natural Disaster Reduction. A third sheet, Types of Landslides, is in preparation. All the sheets will be translated into all the UNESCO languages.

DIMENSIONS OF LANDSLIDES

- 1) **Width of the displaced mass, W_d** , the maximum breadth of the displaced mass perpendicular to the length, L_d .
- 2) **Width of the rupture surface, W_r** , the maximum width between the flanks of the landslide, perpendicular to the length, L_r .
- 3) **Total length, L** , the minimum distance from the tip of the landslide to its crown.
- 4) **Length of the displaced mass, L_d** , the minimum distance from the tip to the top.
- 5) **Length of the rupture surface, L_r** , the minimum distance from the toe of the surface of rupture to the crown.
- 6) **Depth of the displaced mass, D_d** , the maximum depth of the displaced mass, measured perpendicular to the plane containing W_d and L_d .
- 7) **Depth of the rupture surface, D_r** , the maximum depth of the rupture surface below the original ground surface measured perpendicular to the plane containing W_r and L_r .

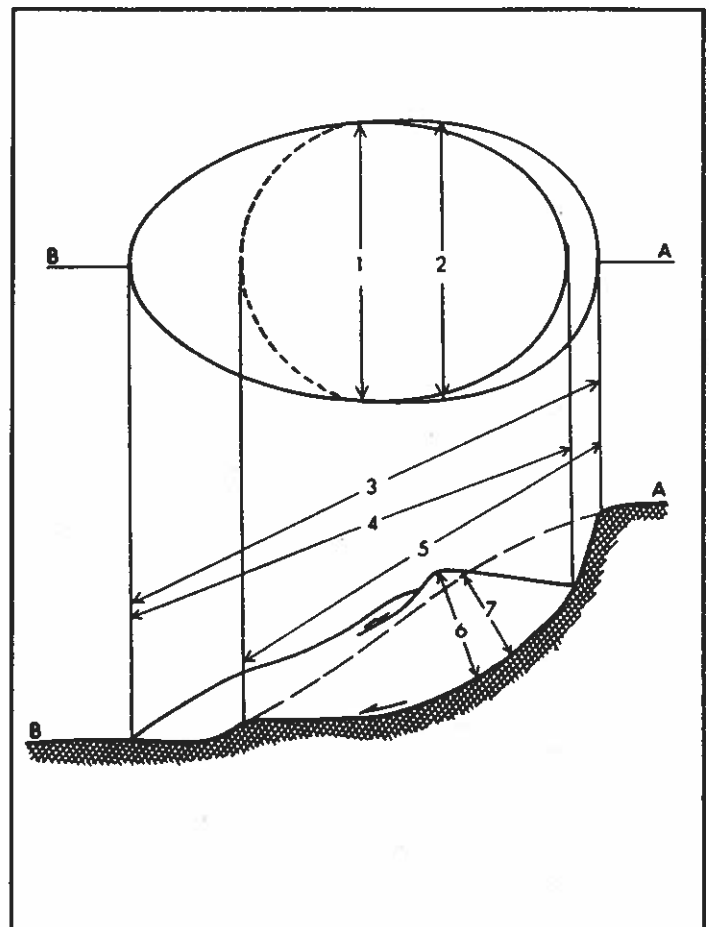


Figure legend

In the section, cross hatching indicates undisturbed ground and the broken line represents the original ground surface. The dashed line in the plan is the trace of the rupture surface on the original ground surface.

FEATURES OF LANDSLIDES

LANDSLIDE FEATURES

- 1) **Crown:** The practically undisplaced material adjacent to the highest parts of the main scarp.
- 2) **Main Scarp:** A steep surface on the undisturbed ground at the upper edge of the landslide caused by movement of the displaced material away from the undisturbed ground.
- 3) **Top:** The highest point of contact between the displaced material (13) and the main scarp (2). Numbers refer to the numbers in the figure to the right.
- 4) **Head:** The upper parts of the landslide along the contact between the displaced material and the main scarp (2).
- 5) **Minor Scarp:** A steep surface on the displaced material of the landslide produced by differential movements within the displaced material.
- 6) **Main body:** The part of the displaced material of the landslide that overlies the surface of rupture between the main scarp (2) and the toe of the surface of rupture (11).
- 7) **Foot:** The portion of the landslide that has moved beyond the toe of the surface of rupture (11) and overlies the original ground surface (20).
- 8) **Tip:** The point on the toe (9) farthest from the top (3) on the landslide.
- 9) **Toe:** The lower, usually curved margin of the displaced material of a landslide, it is the most distant from the main scarp (2).
- 10) **Surface of rupture:** The surface forming the lower boundary of the displaced material below the original ground surface.
- 11) **Toe of surface of rupture:** The intersection (usually buried) between the lower part of the surface of rupture (10) of a landslide and the original ground surface.
- 12) **Surface of separation:** The part of the original ground surface now overlain by the foot (7) of the landslide.
- 13) **Displaced material:** Material displaced from its original position on the slope by movement in the landslide. It forms both the depleted mass (17) and the accumulation (18). It is stippled in the figure.
- 14) **Zone of depletion:** The area of the landslide within which the displaced material (13) lies below the original ground surface (2).
- 15) **Zone of accumulation:** The area of the landslide within which the displaced material lies above the original ground surface (20).
- 16) **Depletion:** The volume bounded by the main scarp (2), the depleted mass (17) and the original ground surface (20).
- 17) **Depleted mass:** The volume of the displaced material which overlies the rupture surface (10) but underlies the original ground surface (20).
- 18) **Accumulation:** The volume of the displaced material (13) which lies above the original ground surface (20).
- 19) **Flank:** The undisplaced material adjacent to the sides of the rupture surface. Compass directions are preferable in describing the flanks but if left and right are used, they refer to the flanks as viewed from the crown.
- 20) **Original ground surface:** The surface of the slope that existed before the landslide took place.

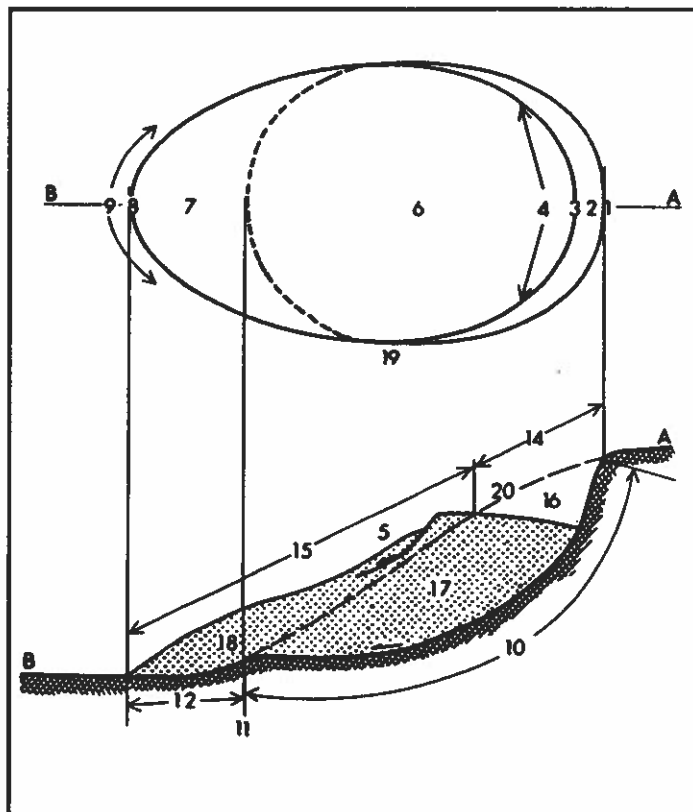


Figure legend:

The upper portion of the figure is a plan of a typical landslide, the dashed line in it is the trace of the rupture surface on the original ground surface. In the section in the lower portion of the figure, cross hatching indicates undisturbed ground, stippling shows the extent of the displaced material.

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SPEAKERS & TITLES FOR 1991 ANNUAL GSA MEETING

Monday, October 21, 8:00 A.M.-12 NOON

ENGINEERING GEOLOGY

**(WAYNE C. ISPHORDING AND EDWIN L. HARP,
PRESIDING) SDCC, ROOM 10**

1. 8:00 A C.J. Booth*, P. J. Carpenter, E. D. Spande, J. T. Kelleher, B. B. Mehnert, D. Van Rosendaal: Geological Control of the Hydrogeological Effects of Longwall Mining: New Interpretations from Recent IMSRP Studies in Illinois [017783]
2. 8:15 A Philip J. Carpenter*, Matthew A. Johnston, Colin J. Booth, Michael P. Matheney: Geophysical Identification of Fractures and Associated Hydrological Effects Over A Collapsing Longwall Mine Panel [008202]
3. 8:30 A Frank A. D'Agnese*, Kenneth E. Kolm: A Method of Regional Aggregate Evaluation of Surficial Materials Using a Geographic Information System [023576]
4. 8:45 A Edwin L. Harp*, Marlene A. Noble: An Engineering Rock Classification to Evaluate Seismic Rock-Fall Susceptibility [022682]
5. 9:00 A William C. Haneberg*: Grain Size Distributions and Sedimentary Facies Associated with a Modern Debris Flow Near Cordova, New Mexico [028823]
6. 9:15 A Ellis L. Krinitzsky*: Intensity-Based Earthquake Hazard Evaluation for Major Engineering Sites in Eastern United States [014273]
7. 9:30 A Terry R. West*: An Engineering Geology Investigation

to Determine Pathways for Contaminant Transport in Limestone Terrain [016909]

8. 9:45 A Mario R. Lluria*, Jeff S. Riddle: Development of a Systematic Land Subsidence Monitoring Program that Includes the Use of Low Sun Angle Aerial Photography and of Satellite Radio Telemetry [024794]

10:00 AMCOFFEE BREAK

9. 10:15 A Vincent S. Cronin*: Engineering Geology Must Be Dominated by a Public-Safety-Based Ethic [028675]
10. 10:30 A Robert G. Crisman*, Paul L. McClay, Roy J. Shlemon: Geologic Bias and Its Effect on Geotechnical Site Evaluations: Old Vail Ranch, Temecula, California [032461]
11. 10:45 A Joan L. Florsheim*, Peter Goodwin, Philip B. Williams, Tim Abbe, Fred A. Booker: Geomorphic Analysis for Restoration of a Tidal Marsh: Slough Channel Evolution and Marsh Plain Sedimentation, San Francisco Bay, CA [025607]
12. 11:00 A Randall W. Jibson*, Carol S. Prentice: Landslides Triggered by the 29 April 1991 Racha Earthquake in Soviet Georgia [016614]
13. 11:15 A James T. Neal*, Thomas R. Magorian, Richard E. Smith, Don W. Whittington: Site Evaluation of Salt Domes for Potential Expansion of the U. S. Strategic Petroleum Reserve (SPR) [032131]
14. 11:30 A Robert H. Osborne*, Chia-Chen Yeh: Sources and Net Transport Pathways for Sand from the 1984-85 Construction Pad Release at the San Onofre Nuclear Generating Station, Southern California: Fourier [006929]

Monday, October 21, 8:00 AM - 12:00 NOON
ENGINEERING GEOLOGY POSTERS
 (Authors will be present from 9:00 to 11:00 AM)
SDCC, Hall B

- Booth 34** Duane A. Eversoll*: Identification and Classification of Roadway-related Landslides in Nebraska [010026]
Booth 35 William R. Eckhoff, Alan C. Samuelson*, Donald L. Eggert, Ned K. Bleuer: Downhole Shear-wave Velocity Studies in Unconsolidated Sediments in Selected Indiana Urban Areas [023969]
Booth 36 Leslie D. Reed*: Sedimentary and Engineering Characteristics of a New Pleistocene Marine Unit, San Diego, California [032182]
Booth 37 Wen-June Su*: Study of Earthquake-induced Landslides in Southern Illinois Near the New Madrid Seismic Zone [028994]

Monday, October 21, 8:00 A.M.
SITE CHARACTERIZATION STUDIES RELATED TO GROUND-WATER AND SURFACE-WATER CONTAMINATION AT SITES OPERATED BY THE U.S. DEPARTMENT OF ENERGY (PART I)
 (Stephen H. Stow, Presiding) SDCC, Room 6D

1. 8:00 A R. P. Whitfield*: An Overview of the U. S. Department of Energy's Program of Environmental Restoration and Site Characterization [019808]
 2. 8:15 A Robert W. Bryce*, Glendon W. Gee, Frank A. Spang, Bruce N. Bjornstad: Hydrogeology of the Hanford Site: Implications for Contaminant Transport [019815]
 3. 8:30 A Robert G. Riley*, John C. Evans, Virginia Rohay: Aspects of Subsurface Contamination at the Hanford Site, South Central Washington State [032684]
 4. 8:45 A Iraj Javandel, Brian M. Smith*: Hydrogeologic Challenges of the Site Restoration Program at Lawrence Berkeley Laboratory [031655]
 5. 9:00 A Rolf K. Aadland*, Horace W. Beldsoe: Hydrogeologic Characterization of the Cretaceous-Tertiary Coastal Plain Sequence at the Savannah River Site [028604]
 6. 9:15 A Mary K. Harris*, Catherine M. Lewis, Thomas F. Gaughan, Thomas M. Westbrook: Hydrogeological Characterization of the Mixed Waste Burial Ground Complex at the Savannah River Site (SRS), Aiken, S. C. [028602]
 9:30 A.....COFFEE BREAK
 7. 10:00 A Jeffrey W. Douthitt*, Bruce E. Phillips: Geological and Hydrogeological Characterization at the Paducah Gaseous Diffusion Plant, Kentucky [019814]
 8. 10:15 A David A. Sawyer*, James C. Cole, Randell J. Laczniaik, Douglas A. Trudeau: Hydrogeologic Uncertainties in the Nevada Test Site Region [001396]
 9. 10:30 A D. W. Rice, Jr.*, D. J. Bishop, J. P. Ziagos: Critical Aspects of Contaminant Characterization at Lawrence Livermore National Laboratory (LLNL), When is Enough, Enough? [024174]

10. 10:45 A A. L. Lamarre*, T. M. Carlsen, R. K. Landgraf, M. J. Taffet, C. P. Webster-Scholten, P. F. Daley, D. W. Carpenter, N. B. Crow, R. A. Ferry, S. M. Bryn, S. P. Vonder Haar: Environmental Investigation and Remedial Activities at Lawrence Livermore National Laboratory Site 300 [025163]
 11. 11:00 A J. J. Nitao*, J. L. Iovenitti, R. O. Devany: Quantitative Evaluation of TCE Vadose Zone Migration to Ground Water, Building 518, Lawrence Livermore National Laboratory [025178]
 12. 11:15 A R. D. Hatcher, Jr., P. J. Lemiszki*, G. K. Moore, W. M. McMaster: Coupled Geologic and Hydrologic Processes in the Oak Ridge Reservation - Interaction in a Fractured Reservoir System [020370]
 13. 11:30 A C. Stephen Haase*, RaNaye B. Dreier, William M. McMaster, Gerald K. Moore, D. Kip Solomon: Characteristics and Modes of Occurrence Groundwater Contaminants on the U. S. Department of Energy Reservation in Oak Ridge, Tennessee [019823]
 14. 11:45 A Eric D. Goller*, James E. Brinkman, Sharad M. Kelkar: An Aquifer Test Involving Complex Conditions at the Mound Plant, Miamisburg, Ohio [028316]

Monday, October 21, 8:00 AM - 12:00 NOON
ENGINEERING GEOLOGY DIVISION: URBAN GEOLOGIC HAZARDS: SOIL AND GROUNDWATER REMEDIATION TECHNOLOGY (POSTERS)
 (Authors will be present from 9:00 to 11:00 A.M.)
SDCC, Hall B

- Booth 70** David W. Valentine*, Edward A. Keller, Dennis R. Gibbs, Philip R. Holland: Watersheds at the Urban Interface: Hydrogeologic Response to Wildfire [015601]
Booth 71 John T. C. Parker*: Assessing Stability of Entrenched Ephemeral Rivers - Arroyo Expansion Along the Santa Cruz River Near Tucson, Arizona, 1936-1986 [028053]
Booth 72 Ali Sadr*: An Ancient Landslide in the Friars Formation, San Diego, California, A Case History [030772]
Booth 73 G. R. Roquemore*, G. W. Simila: Seismicity of the San Diego Region: Rose Canyon Fault and Inner Continental Borderland [031675]
Booth 74 James E. Walters*: Site Assessment and Remediation Techniques Designed to Expedite Clean-up of Hydrocarbon Contaminated Soils and Groundwater [002668]
Booth 75 P. W. Krauter*, D. W. Rice, Jr.: Distribution and Characterization of Indigenous Subsurface Bacteria Associated with a Gasoline-Spill Site and with a Clean Site [025168]
Booth 76 Mark R. Noll*, Stephen P. Cline, Marcia H. Baumel, Randy L. Darr: *In-Situ* Permeability Reduction and Chemical Fixation Using Colloidal Silica [025262]
Booth 77 Barry S. Pulver*, B. Lithgow: Remediation of Diesel-Contaminated Soil Via Above-Ground Treatment with Nutrients [032490]

Monday, October 21, 1:00 P.M.

SITE CHARACTERIZATION STUDIES RELATED TO GROUND-WATER AND SURFACE-WATER CONTAMINATION AT SITES OPERATED BY THE U.S. DEPARTMENT OF ENERGY (PART II)

(Stephen H. Stow, Presiding) SDCC, Room 6D

1. 1:00 P Andrew I. Adams*, Fraser Goff: A Regional Study of Stable Isotopes and Tritium in Precipitation in the Los Alamos Region of New Mexico [016710]
2. 1:15 P Kathryn J. Tegmeyer*, Myra K. Vaag, Marcella C. Broussard, James W. Langman: Surface Geologic Mapping at Rocky Flats Plant, Jefferson County, CO.: An Often Overlooked, Inexpensive, Non-intrusive Method for Characterizing Groundwater [025300]
3. 1:30 P William R. Hackett*, Richard P. Smith: The Geology of the Idaho National Engineering Laboratory: Volcanism and Tectonics in the Wake of the Yellowstone Plume [031962]

Monday, October 21, 1:00 - 5:00 P.M.

SITE CHARACTERIZATION STUDIES RELATED TO GROUND-WATER AND SURFACE-WATER CONTAMINATION AT SITES OPERATED BY THE U.S. DEPARTMENT OF ENERGY (POSTERS)

(Authors will be present from 2:00 to 4:00 P.M.) SDCC, HALL B

Booth 74 E. M. Nichols*, P. F. McKereghan, A. F. B. Thompson: Simulating Ground Water Flow Beneath Lawrence Livermore National Laboratory (LLNL) [025172]

Booth 75 C. W. Bishop*, T. C. Rasmussen, M. J. Sully, S. A. Rawson: Laboratory Determination of Snake River Plain Basalt Physical and Hydraulic Properties [032378]

Booth 76 Craig A. Dicke*, Robert W. Smith, Joel M. Hubbell: Geochemical Modeling of Soil Water Chemistries from the Subsurface Disposal Area at the Radioactive Waste Management Complex, Idaho National Engineering Laboratory [006179]

Monday, October 21, 1:30 - 5 PM

ENGINEERING GEOLOGY DIVISION: URBAN GEOLOGIC HAZARDS/SOIL AND GROUND-WATER REMEDIATION TECHNOLOGY

(Daryl Streiff and Lyne Perry, Presiding) SDCC, Room 11A

1. 1:30 P James Neiheisel*: Application of Petrographic Procedures in the Remediation of Radioactively Contaminated Soils [024599]

2. 1:45 P Peter A. Gintautas*, Stephen R. Daniel, Donald L. Macalady: Organic Composition of Municipal Landfill Leachates and the Potential for Groundwater Contamination [032099]
3. 2:00 P Yijun Du*, Atilla Aydin: Geometry and Incremental Growth of Very Shallow Hydraulic Fractures from Inversion of Elevation Changes [003785]
4. 2:15 P P. J. Hall*, M. P. Dickenson: An Evaluation of Aquifer Restoration through Numerical Modeling within a Variable and Complex Volatile Organic Plume [028196]
5. 2:30 P Patrick E. Smith*: Landslide in Monterey Formation Siltstone During Construction of a Major Roadway in Southern California: A Case History [025650]
6. 2:45 P Eric A. Johansen*, Willis D. Weight: Quantitative Analysis of the Variables Causing Debris Flows [032134]
7. 3:00 P P. K. House*, P. A. Pearthree, K. R. Vincent: Flow Patterns, Flow Hydraulics, and Flood-Hazard Implications of a Recent Extreme Alluvial-Fan Flood in Southern Arizona [022432]
8. 3:15 P John J. Field*, Philip A. Pearthree: Geomorphic Mapping of Flood Hazards on Desert Piedmonts: A Case Study from the White Tank Mountains, Arizona [022431]
9. 3:30 P Wendell L. Barner, Patricia Miller*: Comparison of Stormwater Management Practices in an Urbanized Karst Terrain in Southwest Missouri [019066]
10. 3:45 P W. Lee Vanderhurst*, Marc P. Delattre: Fault Investigations in the Urban Environment, Downtown San Diego, California [024576]
11. 4:00 P Roger C. Slayman*, Daryl Streiff: Geologic Hazards of the University of California, Santa Barbara Campus [019875]
12. 4:15 P Jerome A. Treiman*: The Rose Canyon Fault Zone and the Alquist-Priolo Special Studies Zones Act [025266]
13. 4:30 P Paul Davis*, Ann Meeker Gandi, Roy J. Shlemon: Ground Cracks and Surface Displacement Murrieta Creek and Wolf Valley Faults, Temecula Area, Riverside County, California [028321]
14. 4:45 P Robert F. Barminski, Jr.* Michael T. Ledbetter: Analysis of Liquefaction/Ground Failure On-shore and Near-shore Moss Landing, CA During the Loma Prieta Earthquake [028129]

Monday, October 21, 2:00 - 5 PM

**ENGINEERING GEOLOGY DIVISION: FAILURE MECHANISMS OF MEGASLIDES
(Martin L. Stout and Michael W. Hart, Presiding)
SDCC, Room 6D**

1. 2:00 P Martin L. Stout*: Mega-Landslides: Fact or Fiction? [023485]
2. 2:15 P Perry L. Ehlig*: Role of Ground Water in Deep-Seated Megaslides in Gently Inclined Sedimentary Rocks [030786]
3. 2:30 P John C. Yarnold*: Internal Motion and Deformation Within Large Rock Avalanches During Runout: Insights from Selected Localities [022453]
4. 2:45 P Richard M. Iverson*: Failure and Runout of Giant Landslides on Hawaiian Volcanoes: Cases of Enigmatic

Mechanics? [025652]

5. 3:00 P David K. Keefer*, J. David Rogers: Seismic Triggering of Large Landslides [022681]
- 3:15 PCOFFEE BREAK
6. 3:30 P H. Jay Melosh*: Evaluation of the Acoustic Fluidization Mechanism for Giant Rock Avalanches [030775]
7. 3:45 P Michael W. Hart*: Failure Mechanisms of Mega-Landslides in the Peninsular Ranges of Southern California [030790]
8. 4:00 P J. David Rogers*: Toreva Block Mega-Landslides in the Colorado River Channel, Grand Canyon, Arizona [030785]
9. 4:15 P B. Brandon Curry*: Summit Lake Landslide, Nevada: An Example of a Small Long Run-out Landslide [030783]
10. 4:30 P Lawrence J. Herber*, Thomas H. Hibner, Michael W. Ressel, Jr., Craig Vrabel, J. David Rogers: Failure Mechanisms of Catastrophic Subalpine Paleolandslides in Crystalline Rock of the Central San Gabriel Mountains, San Antonio Canyon, Southern California [023512]

Tuesday, October 22, 8:00 A.M.-12 NOON

ENGINEERING GEOLOGY DIVISION SYMPOSIUM (S3): GEORISK ASSESSMENT
(Charles W. Welby and Rhea L. Graham, Presiding)
SDCC ROOM 6D

OPENING REMARKS

1. 8:15 A Barry F. Beck*: A Methodology for Calculating the Risk of Sinkhole Collapse [019721]
2. 8:15 A Allan G. Barrows*, Pamela J. Irvine, Michael W. Manson: California's Landslide Hazard Identification Program [019762]
3. 9:05 A Russell H. Campbell*, Richard L. Bernknopf: Forecasting the Spatial Distribution of Landslide Risk [019760]
4. 9:30 A Travis H. Hughes*, Lois D. George: Hydrogeologic Systems, Contamination and Risk [019760]
- 9:55 ACOFFEE BREAK.
5. 10:10 A John F. Mann, Jr.*: Hydrogeologic Risk Assessment of Long-Term Nonpoint Pollution [019715]
6. 10:35 A Mark Crowell*, A. Todd Davison, Michael K. Buckley: Comprehensive Erosion Hazard Identification Through The National Flood Insurance Program [019765]
7. 11:00 A Kenneth J. Berger*: The Impact of Georisk Factors in Insurance Underwriting and Risk Management [019716]
- 11:25 A Closing Comments

Tuesday, October 22, 1:30 - 6 PM

ENVIRONMENTAL GEOLOGY/ ENGINEERING GEOLOGY I
(Kenneth E. Kolm and Adam R. Hutter, Presiding)
SDCC, Room 6D

1. 1:30 P R. G. Bowman, H. G. Siegrist, Jr.*, R. H. Randall, P. B. Stifel: Geochemical Responses to Power Plant Efflu-

ent on a Modern Coral Reef on Guam [027976]

2. 1:45 P Daniel J. Greeman*, Arthur W. Rose: Geochemical Controls on Radon Emanation in Soils; Importance of "Organic" Radium [011055]
3. 2:00 P Charles E. Russel*, Roger L. Jacobson, Penny S. Amy: Spatial Variability of Deep Subsurface Microorganisms in Relatively Homogeneous Ash-fall Tuffs and Correlation to Hydrogeologic and Geochemical Parameters [032199]
4. 2:15 P David Stewart*: Region-Specific Earthquake Intensity Mapping for Pre-earthquake Planning [023386]
5. 2:30 P Teresa S. Bowers*, Brian L. Murphy, Robert L. Bornschein: Determination of the Contribution of Environmental Lead Sources to Elevated Blood Lead in Children, and Assessment of Appropriate Cleanup Strategies [028105]
6. 2:45 P Paul D. Collar*: Fluvial Metal Transport During a Storm Event, Rio Grande de Loiza Basin, Puerto Rico [004431]
7. 3:00 P Jacques L. Chasse*, Rona J. Donahoe: Attenuation of Metals from a Treated Wastewater Solution by Sandy Loam Soil [008837]
8. 3:15 P Mary A. Siders*, Donald D. Runnels: Impact of the Forest Fires of 1988 on the Chemistry of Non-thermal Ground Water in Yellowstone National Park [021474].
9. 3:30 P Gareth J. Davies*, Gisella M. Spreizer: Interpretation of Water Temperature Variation as an Aid in Designing Groundwater Monitoring Systems in Karst Terranes [025304]
10. 3:45 P Forrest Hopson*: Hazard Zones for Assessing the Impact of Future Volcanic Eruptions on Water Resources in the Long Valley Area, Eastern California [024842].
11. 4:00 P Mario Mejia-Navarro*: Geological Hazard Zonation Medellin (Colombia)-West Sector, GIS Application Model [028060]
12. 4:15 P James G. Rigby*, Lindsay G. Christensen, Jonathan G. Price: Geological Implications of Radon Hazard Surveys: Experience from Nevada [006380]
13. 4:30 P D. B. Scott*, C. T. Schafer, P. Pocklington, C. Honig: Modification of Local Seafloor Environments by Aquaculture Operations: Temporal Changes Reflected by Benthonic Foraminifera Assemblages [024830]
14. 4:30 P Wayne C. Isphording*, Tamara L. Gibbons, R. Bradford Jackson, Valentina A. Chudaeva: Ion Site Partitioning Controls on the Environmental Mobility of Heavy Metals [009648]
15. 5:00 P William R. Smith*, Darrell I. Leap: Use of Models to Estimate Hydraulic Conductivity of a Till Barrier Layer, and Potential Effects of RCRA Corrective Action Scenarios [016904]
16. 5:15 P Adam R. Hutter*, Herbert W. Feely: Trends in the Long-term ²²²Rn and ²²⁰Rn Soil Gas Concentrations at Two Sites in New Jersey [010765]

Wednesday, October 23, 8:00 AM-12 NOON
PREDICTIVE MODELS FOR GLOBAL ENVIRONMENT AND RESOURCE DEVELOPMENT

(William S. Fyfe and Carol Ann Hodges, Presiding)
SDCC, ROOM 17B

1. 8:00 A Garry D. McKenzie*: Human Bolides and Geo-Quality of Life [014608]
2. 8:15 A Richard W. Hurst*: Evaluating the Local and Global Impact of Fossil Fuels on the Environment Using Sr and Pb Isotopes [022752]
3. 8:30 A Larry Mayer, Dong Wang*: Relations Between Time Scale and the Definition, Identification and Strategies for the Geomorphological Study of Climate Change Based on U. S. Drought Records Since 1895 [027974]
4. 8:45 A Pamela Hallock*, Frank Muller-Karger: Coral Reefs and Environmental Change: A Caribbean Perspective [031503]
5. 9:00 A Priscilla C. Grew*: The Global Challenge: Geology of the Twenty-First Century Cities [032507]
6. 9:15 A Timothy C. Weiskel*: Muddles in the Models: Ecosystemic Process, Cultural Understandings and the Limits of Human Metaphor in Devising Public Policy for Global Environmental Change [020101]
7. 9:30 A Keith D. Wilde*: Influence of Environmental Geology on Economic Policy [020103]
8. 9:45 A W. S. Fyfe*: How Good Are the Models: The Fate of the Next 5(10) Billion [017336]
- 10:00 A.....COFFEE BREAK
9. 10:15 A James C. Cobb*, Donald C. Haney: Kentucky - A Model for Coal Availability Investigations [012558]
10. 10:30 A James R. Herring*, William F. Stowasser: Phosphate - Our Nation's Most Important Agricultural Mineral Commodity and Its Uncertain Future [025745]
11. 10:45 A K. K. Cohen*, T. K. Shea, M. A. Trevits: The Legacy and Consequences of Iron-Ore Mining in New Jersey: A Case Study From Mine Hill Township [032149]
12. 11:00 A John D. Grace*: Entropy as a Measure of Resource Scarcity: Geologic and Exploration Dimensions [024863]

Wednesday, October 23, 8:00 -10:30 AM
ENVIRONMENTAL GEOLOGY/ ENGINEERING GEOLOGY II

(Peter Gintautas, Presiding) SDCC, Room 7A

1. 8:00 A Sabine E. Apitz*, Lisa M. Vogel, Stephen H. Lieberman: The Calibration of the *In Situ* Florescence of Polycyclic Aromatic Hydrocarbons in Toxic Waste Sites as a Function of Soil Type and Conditions [032338]
2. 8:15 A Carroll F. Knutson*, Kelli A. McCormick: Geostatistical Characterization of Eastern Snake River Plain Basalts, Idaho [032330]
3. 8:30 A P. F. Daley*, T. M. Carlsen, M. J. Taffet, R. K. Landgraf, A. J. Boegel, P. L. Cedarwall, S. M. Bryn, R. A. Ferry, S. P. Vonder Haar: Development of Innovative Approaches

to Site Investigation and Remediation at Lawrence Livermore National Laboratory Site 300 [025167]

4. 8:45 A Clark Poore*, Donald Metzler, Armand Groffman, Bill Downs: Uranium Mill Tailings Effects on Seep Water Quality in Gypsum Creek; Mexican Hat, Utah [020867].
5. 9:00 A David R. McQueen*: Chemistry of Contaminated Ground Water at Regulated Facilities in Northeast Louisiana: What Chemicals Are Actually There? [007775]
6. 9:15 A J. R. Arnold*, D. Lal, C. P. Kohl, K. Nishiizumi: Nuclear Studies of Geomorphic Processes [025024]
7. 9:30 A Th. Graf*, C. P. Kohl, K. Marti, S. Nidermann, K. Nishiizumi: Cosmic-ray Produced Ne in Terrestrial Rocks [025023]
8. 9:45 A Catherine M. Lewis*, Mary K. Harris, Thomas F. Gaughan, Mark B. Amidon: Preferential Contaminant Flow Pathways in Unconsolidated Coastal Plain Sediments, Case Studies at SRS [028606]

Wednesday, October 23, 1:30 - 5:30 P.M.
PREDICTIVE MODELS FOR GLOBAL ENVIRONMENT AND RESOURCE DEVELOPMENT (POSTERS)

(Authors will be present from 2:30 to 4:30 P.M.)
SDCC, Hall B

- Booth 93** Dorian Elder Kuper*: Environmental Considerations and Geotechnical Designs for Gravel Resource Extraction Along Scenic Rivers in the Northwest [002904]
- BOOTH 94** Eve Iversen*: Ground Water in San Francisco County, California: A Resource and A Responsibility [006723]

Thursday, October 24, 8:00 AM - 12 NOON
ENVIRONMENTAL GEOLOGY/ENGINEERING GEOLOGY (POSTERS)

(Authors will be present from 9:00-11:00 A.M.)
SDCC, Hall B

- Booth 1** Chacko, J. John*, D. A. Stevenson, C. G. Groat: Testing, Environmental Monitoring, and Potential Commercial Utilization of the Gulf Coast Geopressed-Geothermal Resource [007656]
- Booth 2** J. C. Boothroyd*, C. W. Galagan, A. Ross, D. P. French, H. Rines, D. Mendelshon: Environmental Mapping/Habitat Inventory of a Coastal-Plain Estuary Shoreline: Narragansett Bay, Rhode Island-Massachusetts [012737]
- Booth 3** David E. Wilkins*, John R. Giardino: Stream-Water Chemistry in the Sangre De Cristo Mountains, New Mexico: A Comparison of 1958 and 1990 Characteristics [013620]
- Booth 4** Carl S. Kirby*, J. Donald Rimstidt: Mineralogy of Municipal Solid Waste Ash [021306]
- Booth 5** L. C. S. Gundersen*, R. R. Schumann, J. K. Otton, R. F. Dubiel, D. E. Owen, K. A. Dickinson: Geologic Radon Potential of the United States [022713]
- Booth 6** Richard S. Della Valle*, Stephen L. Bolivar, Jeffrey C. Edwards: Radon Distribution over Central California Oil

Fields [031641]

Booth 7 M. A. Kelly*, C. R. Berquist, Jr., B. K. Goodwin: Radon in Homes and in Sediments, Southeastern Virginia Coastal Plain [031828]

Booth 8 Elaine Kotler*: Experimental Analysis on the Effects of Water Velocity, CO₂ Content and CaCO₃ Saturation State on Calcification in Coral Reef Flat Communities [002743]

Booth 9 Ray E. Ferrell, Jr.* Adrian Pflüss: Image Analysis Techniques for the Characterization of Pb in Fly Ash from Municipal Waste Incinerators [007728]

Booth 10 Bruce N. Bjornstad*, Philip E. Long, James P. McKinley: Paleosols of the Ringold Formation: Significance for Hazardous Waste Bioremediation and Paleoclimatic Assessment [013926]

Booth 11 Philip E. Long*, James F. Fredrickson, Ellyn M. Murphy, Shirley A. Rawson, James P. McKinley, Fred J. Brockman, Bruce N. Bjornstad: Geohydrologic and Geochemical Controls on Subsurface Microorganisms in Late Cenozoic Sediments, South-Central Washington [013927]

Booth 12 L. L. Rogers*: Simulation-Management Methodology Involving Solute Transport, Nonlinear Programming, and Multiple Management Periods [025175]

Booth 13 G. M. Haselton*: Periglacial Features Indicative of Late Wisconsinan Climatic Change in the Southern Appalachian Mountains [018959]

In the September 1991 issue of *GSA Today*, pp 198-201 there is a detailed overview of the San Diego Annual Meeting Program. The overview gives a list of the symposia, theme sessions, event highlights, and fieldtrips.

GSA SECTION MEETINGS 1992

Feb 24-25: South-Central Houston, Texas, Rice University, Hans G. Ave Lallemand, Department of Geology & Geophysics, P. O. Box 1892, Rice University, Houston TX 77251; 713/527-4889

Mar 18-20: Southeastern Winston-Salem NC, Stouffer-Winston Plaza. Paul D. Fullagar, Department of Geology, CB 3315 Mitchell Hall, University of North Carolina, Chapel Hill NC 27599-3315: 919/962-0677

Mar 26-28: Northeastern, Harrisburg PA, Harrisburg Hilton, Donald M. Hoskins, Pennsylvania Geological Survey, Department of Environmental Resources, P. O. Box 2357, Harrisburg PA 17105; 717/787-2169

Apr 30-May 1: North-Central Iowa City IA, University of Iowa. Raymond R. Anderson, Iowa DNR, Geological Survey, University of Iowa, 123 N. Capital St., Iowa City IA 55242; 319/335-1575

May 11-13: Cordilleran, Eugene OR, Eugene Hilton Conference Center. A. Dana Johnston, Department of Geological Sciences, University of Oregon, Eugene OR 97403-1271; 503/346-5588

May 13-15: Rocky Mountain, Ogden UT, Ogden Park Hotel. Sidney R. Ash, Department of Geology, Weber State University, Ogden UT 84408-2507; 801/626-6908.

George A. Kiersch, Editor, *The Heritage of Engineering Geology: The First Hundred Years*, Geological Society of America: Centennial Special Volume 3, Boulder, Colorado, 1991, 605 pp, \$62.50, ISBN 0-8137-5303-1.

This book is considerably more than its title suggests. *The First Hundred Years* refers to the centennial anniversary of the Geological Society of America, and the book very credibly commemorates the developments in engineering geology with emphasis on the leading professionals and their contributions. However, the book also contains a history of engineering geology that reaches back into antiquity, and there is a series of extensive reviews that make up the bulk of the book that lead to and describe the current state-of-the-art of its many disciplines.

Engineering Geology is geological work that is relevant for engineered construction, environmental control, or life safety. Because it has diverse relationships with other fields, engineering geology is subject to encroachments by non-geologists. Civil engineers, soil mechanic specialists, hydraulic engineers, even seismologists, are apt to claim expertise at the expense of engineering geologists. They do so only with disadvantages to their projects because the engineering geologist is better prepared for those tasks. A book such as this amply shows what constitutes the engineering geologist's domain.

Besides the history of engineering geology and its professional practice in general, the book surveys the relevances to engineering of geological processes, gives a comprehensive survey of the methods in accomplishing geological investigations, and discusses failures, litigation, and the geologist's responsibilities. There are instructive discussions of surface and ground water, sea coasts, slopes, subsidence, faults, earthquakes, rebound from unloading, permafrost, construction materials, and siting. The state-of-the-art is here as well as extensive collections of useful experience.

This book is a credit to the many experienced professionals who brought its parts into being, but the greatest credit rests with George Kiersch who not only contributed much to the content of the book but performed a great service by bringing together a superb group of reviews. This is a book that every engineering geologist can read with profit.

E. L. Krinitzsky
U. S. Army Corps of Engineers
Vicksburg, Mississippi

**BIOGRAPHICAL SKETCHES
NOMINEES FOR
1991-1992
ENGINEERING GEOLOGY DIVISION OFFICERS**

**CHARLES W. WELBY, CHAIRMAN
JEROME V. DEGRAFF, CHAIRMAN-ELECT
RHEA LYDIA GRAHAM, SECRETARY-TREASURER
JOHN D. ROCKAWAY, MEMBER-AT-LARGE**

Chairman

Charles W. Welby was born in 1926 and grew up in Taft, California. He received his BS degree in Economic Geology in 1948, 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 the 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, 27695.

Chairman-Elect

Jerome V. DeGraff was born in 1945 in Canadaville 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, the 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 include 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.

Secretary-Treasurer

Rhea Lydia Graham was born in 1952 in Terre Haute IN. She received an A.B. in Geology at Bryn Mawr College in 1974, an M.A. 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.

Member-At-Large

John D. Rockaway was born in 1938 in Cincinnati, Ohio. He received his B.S. degree in Geological Engineering from the Colorado School of Mines in 1961 and his M.S. degree from Purdue University in 1963. Following two years of active duty with the U. S. Army Corps of Engineers, he returned to Purdue and received his Ph.D. in 1968. He joined the Department of Geological Engineering at the University of Missouri-Rolla in 1968 and was Chairman from 1981 through 1987. He is a member of the Association of Engineering Geologists, International Association of Engineering Geologists, National Water Well Association, and the Society of Mining Engineers. He currently is a member of the ASCE-GSA-AEG Committee on Engineering Geology and serves as Chairman of the Missouri Dam and Reservoir Council. He has been a consulting geologist on a variety of projects, chiefly related to investigation of geologic hazards and site selection studies. His research interests include seismic risk studies in the mid-continent area, coal mine stability studies, and development of programs in environmental geosciences for secondary education. His current address is: Department of Geological Engineering, University of Missouri-Rolla, Rolla, Missouri 65401.

TRAVEL GRANT

THE GSA IS ACCEPTING TRAVEL APPLICATIONS FOR THE 29th INTERNATIONAL GEOLOGICAL CONGRESS IN KYOTO, JAPAN - 1992

This program was established as a final act of the Organizing Committee for the U. S.-hosted 28th IGC held in Washington, D. C. in July 1989. Surplus funds available at the conclusion of the 28th IGC were transferred to the GSA Foundation with the stipulation that income from the fund be used to support the attendance of young geoscientists to future IGC meetings until such time as the United States again hosts an IGC. Travel grants will consist of economy airfare to Japan and prepayment of the registration fee.

To be eligible an applicant must be a resident or citizen of the United

States (includes students); must have a birthdate after 8/31/52; and must have submitted an abstract for inclusion in the program of the 29th IGC.

Official application forms are available from:
Grants Coordinator, GSA Headquarters
3300 Penrose Place, P. O. Box 9140
Boulder, CO 80301.

Along with applications - you must include a copy of your abstract, two letters of recommendation from current or recent supervisors (students may use faculty members). **Qualifying applications and letters of support must be postmarked no later than October 31, 1991.** Applicants will be notified of results early in 1992.

NEWSLETTER

If you have any suggestions, corrections or input for the next issue of *The Engineering Geologist* please contact the editor or his assistant at Texas A&M University, Department of Geography, College Station, Texas 77843-3147. Phone (409)845-7141.

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