

SPECIAL  
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MAY 1987

## Survey Responses Help GSA Plan Future Meetings

by Sue Beggs  
GSA Meetings Manager

As we look forward to celebrating the Society's 100th year, it is appropriate to ask questions about the future direction of GSA's annual meetings. The answers we received to our recent survey will be the foundation on which to make our decisions for the years ahead.

Each of the 4452 registrants at the 1986 GSA Annual Meeting in San Antonio received a survey form. Of these, 737 completed and returned the questionnaire to GSA by December 1, 1986. After the meeting, the survey was sent to a sample group of 750 GSA members who did not attend the meeting. Of this group, 259 responded by February 6, 1987. The total number of respondents was 996.

### Highlights

- Substantial numbers in both groups reported that GSA is the meeting at which they are most likely to find *new* information.
- The groups agreed that the most popular meeting destinations are San Francisco, Denver, San Diego, Boston, and Phoenix.
- The primary reasons listed for not attending a meeting were high cost, no funding, and location. Few respondents listed time of year, early abstracts deadline, lack of information, or conflict with other meetings as reasons for not attending.
- Between 88.7% and 91.89% of both groups approved submitting volunteered papers to theme sessions.
- Although we had heard that many people oppose the timing of GSA's abstracts deadline, the majority of respondents indicated continued support for the review process and resistance to delaying receipt of the abstracts volume or increasing the cost of the volume by mailing it first class.
- In both groups, approximately 50% opposed frequently repeating the meeting site. Nonattendees favored moving more field trips to the section meetings; this group also indicated substantially lower attendance at GSA annual meetings.
- Between 77% and 84% of both groups favored field conferences held separately from the annual meeting. The most popular sites

listed were the Grand Canyon, China, New Zealand, and Mount St. Helens.

The survey questions and results are given below.

Registrant Profile	Attendees	Nonattendees
1. Did you (or would you) register as a professional or student?		
Professional	587 79.65%	208 80.31%
Student	150 20.35%	51 19.69%
	737 100.00%	259 100.00%
2. To what professional societies do you currently belong?		
None	23 01.25%	0 00.00%
GSA	584 31.64%	247 36.76%
AAPG	208 11.27%	96 14.29%
AIPG	48 02.60%	20 02.98%
AGU	272 14.73%	66 09.82%
AEG	17 00.92%	24 03.57%
SEG	79 04.28%	32 04.76%
SEPM	178 09.64%	53 07.89%
Other	437 23.67%	134 19.93%
	1846 100.00%	672 100.00%
3. Are you male or female?		
Male	588 79.78%	219 84.56%
Female	149 20.22%	40 15.44%
	737 100.00%	259 100.00%
4. Please circle your age bracket.		
Under 25 years	30 04.07%	16 06.18%
25 to 35 years	247 33.51%	82 31.66%
36 to 45 years	189 25.64%	62 23.94%
46 to 60 years	209 28.36%	65 25.10%
Over 60 years	62 08.42%	34 13.12%
	737 100.00%	259 100.00%

(continued on p. 98)

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# PHOENIX

## 1987 Annual Meeting Short Courses

### GSA Short Courses

All courses sponsored by GSA will be held immediately before and after the GSA Annual Meeting in Phoenix, Arizona. Increase the benefits of attending the GSA meeting by participating in one of GSA's professional instruction programs. The courses are designed for several different professional levels. We hope you will find one that meets your needs.

**Enrollment.** Course participation is open to GSA members and nonmembers. Registration for the 1987 Annual Meeting is not required. Registration forms for the short courses and the annual meeting will appear in the August issue of *GSA News & Information*. However, if you would like to register now, contact the Course Registrar and receive a registration form along with the GSA Short Course brochure. *Save significantly by registering in advance.* On-site registration will be \$25 additional and based on availability. **PREREGISTRATION DEADLINE IS SEPTEMBER 25, 1987.**

**Cancellation.** Fees will be refunded if we are notified by October 2. Registration substitutions may be made at any time.

For more information, contact

Course Registrar  
GSA Headquarters  
P.O. Box 9140  
Boulder, CO 80301  
(303) 447-2020

### Planetary Geology and Remote Sensing: Short Courses and Field Trips

Friday, October 23; Saturday, October 24; and Sunday, October 25.  
Co-sponsor: Planetary Geology Division

You may register for one, two, or all three days of this combination of short courses and field trips.

**Day One: Remote Sensing**—Friday, October 23, 7:30 a.m. to 7:30 p.m. Designed as an up-date for those with a remote-sensing background, the course will emphasize imaging spectrometry as applied to mineral exploration. Course will include an afternoon field trip to the Silver Bell Mining District.

**Faculty:** *Raymond Arvidson*, Earth Science/Geology Dept., Washington University; Ph.D., Brown University. Arvidson has participated on various NASA science advisory and mission planning panels and currently heads the Committee on Data Management of the National Academy of Sciences. *Alex Goetz*, Dept. of Geological Sciences, University of Colorado; Ph.D., Caltech. A Fellow of CIRES, Goetz is also the Director of the Center for the Study of Earth From Space. *Edward Guinness*, Dept. of Earth & Planetary Sciences, Washington University; Ph.D., Washington University. Guinness has more than 12 years experience in the field of remote sensing. He specializes in the construction of geologic maps from Earth and Mars and the study of eolian transport of sediments on Mars. *Michael Abrams*, Research Scientist, Jet Propulsion Laboratory, Pasadena.

Fee includes field trip transportation and a course manual that contains numerous black and white and color high-quality photo-

graphic prints acquired from aircraft and satellite sensors. Limit: 30. Fee: \$85.

**Day Two: Introduction to Planetary Geology**—Saturday, October 24, 8:00 a.m. to 4:00 p.m.

Aimed at those with a basic background in geoscience or for those with an interest in planetary geoscience, this is an introductory course to the fundamentals of planetary geology and the results of solar system exploration.

**Faculty:** *Ronald Greeley*, Dept. of Geology, Arizona State University; Ph.D., University of Missouri. Greeley is active in planetary geologic mapping programs, Mars data analysis and the Galileo mission to Jupiter. Greeley leads a consortium of engineers and scientists simulating planetary processes in the laboratory using high-, ambient-, and low-pressure wind tunnels and NASA's hyper-velocity ballistic impact range. *Donald Gault*, NASA-Ames Research Center, retired. Former Branch Chief, Planetology, NASA, Gault is well known in the field of planetology, and received the NASA Medal for Exceptional Scientific Achievement in 1967. This year Gault is the recipient of the G. K. Gilbert Award presented by the GSA Planetary Geology Division. *James W. Head*, Dept. of Geological Sciences, Brown University; Ph.D., Brown University. Head won NASA's Medal for Exceptional Scientific Achievement in 1971 and the GSA Special Commendation in 1973, both for the geologic training of the Apollo astronauts. *Paul Spudis*, Geologist, Astrogeology Branch, U.S. Geological Survey, Flagstaff, Arizona.

Fee includes course manual. Limit: 30. Fee: \$45.

**Day Three: Crater Field Trip (The "Holey" Tour)**—Flagstaff, Arizona, Saturday, October 24, 4:00 p.m. to Sunday, October 25, 7:00 p.m.

Designed for those with a background in geoscience, but appropriate for anyone with an interest in planetary geology, this field trip will examine craters of six different origins. The field trip begins on Saturday, October 24; buses depart at 4:00 p.m. from Arizona State University, Tempe. A picnic supper will be served en route during a stopover at Sunset Point, Black Mesa. The trip arrives at the Americana Motel in Flagstaff at 10 p.m. Sunday, October 25, beginning at 7:30 a.m., the trip continues to Meteor Crater (impact crater), Rattlesnake Butte (maar crater), Sunset Crater (volcanic cinder cone), Mormon Lake (volcano-tectonic depression), Stoneman Lake (basalt pit crater), and Montezuma's Well (karst sink hole). Arrival back at the Phoenix Civic Plaza is scheduled for 7:00 p.m., in time for the GSA Welcoming Party.

Fee includes transportation, a picnic supper, and motel accommodations on October 24, and a box lunch on October 25. Limit: 30. Fee: \$70.

### Contaminant Hydrogeology

Saturday, October 24, and Sunday, October 25, 8:30 a.m. to 4:30 p.m. Co-sponsor: Hydrogeology Division

This course will provide an introduction to the theory and practice of contaminant hydrogeology. It will be of interest to

(continued on p. 104)

# PHOENIX

working professionals and graduate students who want to develop a basic understanding of this field. The course will include an examination of

- fundamental concepts of physical mass transport, advection, dispersion, and diffusion;
- the most important geochemical processes that influence the spread of contaminants, including surface reactions, complexation, and mineral precipitation; and
- the mathematical formulation and solution of mass transport equations with an emphasis on approaches and concepts rather than detailed mathematics.

Examination of these topics will be linked to practice through the use of case histories and problems, group discussions, and demonstrations.

Faculty: *Frank W. Schwartz*, Dept. of Geology, University of Alberta; Ph.D., University of Illinois. Internationally known for his work in groundwater modeling, field and theoretical aspects of contaminant hydrogeology, watershed hydrology, and groundwater geochemistry, Schwartz is the author of more than 40 scientific publications. *J. Leslie Smith*, Dept. of Geology, University of British Columbia; Ph.D., University of British Columbia. As a consultant and researcher, Smith has worked on problems of the emplacement of high-level radioactive wastes in the subsurface, modeling of flow and transport in fractured media, and groundwater resource evaluation. Smith is internationally known for his work on stochastic modeling of groundwater flow. Schwartz and Smith were co-recipients of the O. E. Meinzer Award for 1984.

Fee includes course manual. Limit: 100. Fee: \$135.

## Quantitative Sedimentary Basin Modeling

Saturday, October 24, 8:00 a.m. to 5:00 p.m. Co-sponsor: Sedimentary Geology Division

Aimed at those with a general sedimentary geology background but no previous knowledge of basin modeling, this course is designed to teach participants the theory and application of analyzing basin subsidence histories and mechanisms. Covered in the course will be

- the causes of basin subsidence in various tectonic settings,
- generating tectonic subsidence histories—geohistory analysis and backstripping,
- lithospheric flexure and basin formation, and
- thermal histories of sedimentary basins.

The course will emphasize the application of these quantitative methods to specific basin examples with the goal that participants learn the tools necessary to analyze subsidence histories of basins on their own. Participants may also wish to enroll in the GSA short course "Current Aspects of Basin Analysis and Sedimentary Geology" on Sunday, October 25, as a follow-up.

Faculty: *Charles L. Angevine*, Dept. of Geology & Geophysics, University of Wyoming; Ph.D., Cornell University. Angevine has published more than 15 articles on various aspects of basin mechanics and quantitative modeling of geologic processes. *Paul L. Heller*, Dept. of Geology & Geophysics, University of Wyoming;

Ph.D., University of Arizona. Heller has published more than 20 articles on various aspects of sedimentation and basin analysis, including subsidence studies of North American basins.

Fee includes course manual and lunch. Limit: 50. Fee: \$90.

## Site Characterization for High-Level Nuclear Waste Disposal

Saturday, October 24, and Sunday, October 25, 8:00 a.m. to 5:00 p.m.

This course will be of interest to newcomers who are entering the serious scientific study of the geologic aspects of the disposal of high-level nuclear waste, as well as those who already have a contact with the field and wish to broaden their perspective on the subject. Faculty, in the field of environmental aspects of geology, will find this course of use in expanding their understanding of the geologic issues involved in characterizing a potential site. Nontechnical persons will gain a better grasp of the general geologic issues of long-term disposal of high-level radioactive waste. The course will consist of lectures, slides, videos, and overheads of the repository areas and research programs. In addition, each guest lecturer will discuss his or her own area of expertise.

Faculty: *Richard G. Craig*, Dept. of Geology, Kent State University; Ph.D., Pennsylvania State University. Craig has worked with nuclear waste disposal problems since 1980. His research emphasizes the effect of climatic change upon long-term waste stability. He prepared the Site Characterization Plan for the Hanford Repository on this topic. His other work includes effects of catastrophic floods upon defense-waste storage sites and preparation of a geological simulation model for the Nevada Test Site. *Carol Hanlon*, U.S. Department of Energy, Washington, D.C. Travel arrangements for Hanlon provided by DOE.

Fee includes course manual, lunch both days, and dinner Saturday evening. Limit: 50. Fee: \$145.

## Current Aspects of Basin Analysis and Sedimentary Geology

Sunday, October 25, 8:00 a.m. to 5:00 p.m. Co-sponsor: Sedimentary Geology Division

This course will provide an introductory overview of the interacting fields of basin analysis and sedimentary geology. The content is intended for earth scientists in advanced academic and governmental programs as well as those in oil, mining, or hydrologic/engineering companies. The goal is to stress interdisciplinary aspects of basin analysis, focusing particularly on how geodynamic processes of basin formation influence both the nature of sediment fills and the maturation of the sediment through diagenesis, fluid circulation, and thermal history. Tectonic subsidence analysis (including backstripping principles) of sedimentary basins is stressed. Additional topics included are basin classification, cratonic sequences, sea-level history and seismic stratigraphy, paleogeography, sedimentary facies, black shales, pelagic cycles, fluid migration through sedimentary basins, and clastic diagenesis. These topics are used to illustrate the role of interpreting sediments as a barometer of basin tectonic processes, and extrinsic basinal processes during basin evolution. The course incorporates basin

# PHOENIX

analyses from the Illinois Basin and the North Sea to illustrate the interdisciplinary approaches discussed in lecture.

Faculty: *George deV. Klein*, Dept. of Geology, University of Illinois at Champaign-Urbana; Ph.D., Yale University. Well known in the fields of basin analysis and clastic sedimentary geology, Klein has more than 25 years experience and is the author of more than 100 publications.

Fee includes course manual and lunch. Limit: 100. Fee: \$90.

## Spreadsheets on Microcomputers: Versatile Geological Tools

Sunday, October 25, 8:00 a.m. to 5:00 p.m.

Directed toward those with little or no experience with microcomputer spreadsheet programs, including computer novices, this course will enable geologists to manipulate many different types of geological data. Course participants will receive a complete commercial spreadsheet program on-disk with printed manual, on-disk geological examples, and a course notebook containing discussion of geological uses of spreadsheets. Registrants will receive hands-on instruction in

- entering text and numerical data into a spreadsheet program,
- defining and using formulas, both simple and complex, and using built-in arithmetic, statistical, and trigonometric functions,
- evaluating the advantages and disadvantages of using the spreadsheet as a database manager,
- using the built-in graphics of the spreadsheet to make x-y plots and histograms, and
- using the built-in programming language of the spreadsheet (also known as macros).

Faculty: *Carol A. Petersen*, Executive Director and co-founder of the Computer Oriented Geological Society (COGS); M.S. in geology, University of Utah. Petersen has worked for a state geological survey, a geological consulting firm, and a major oil company. *R. Mark Maslyn*, co-founder of Computer Oriented Geological Society (COGS); M.S. in geology, Colorado School of Mines. Maslyn has 10 years of geological experience in the fields of uranium and petroleum exploration and 15 years of programming experience.

Fee includes spreadsheet program, course manual, and diskette of exercises. Limit: 30. Fee: \$175.

## Writing History of Geology: A Workshop

Sunday, October 25, 8:00 a.m. to 5:00 p.m.

This course is designed for two groups: beginners in the history of geology, and geologists with some experience in the topic. The course will concentrate on how to research and write two common types of history of geology: (1) biographies (including memorials), and (2) review essays (summaries of a major tradition or line of advance leading to present thinking). The objective of the course is to improve the skills of those who already have some experience in the history of geology and to share those experiences with those who are just starting in the field. This course will be significantly helpful to researchers working on historical projects in connection with the GSA Centennial Celebration in 1988.

Faculty: *Mott Greene*, John B. Magee Distinguished Professor in the Honors Program, University of Puget Sound; Ph.D., University of Washington. Greene received the MacArthur Fellowship after publishing a major book on 19th century theories on mountain building. He is currently at work on a book on Alfred Wegener. *Michele L. Aldrich*, American Association for the Advancement of Science, Washington, D.C.; Ph.D., University of Texas, Austin. Aldrich has written numerous articles and books on 19th century American geology. *Clifford M. Nelson, Jr.*, U.S. Geological Survey, Reston; Ph.D., University of California at Berkeley. Nelson has presented numerous papers on the history of paleontology and stratigraphy. He is currently at work on a biography of F. B. Meek.

Fee includes course manual. Limit: 35. Fee: \$65.

## Paleoseismology and Active Tectonics

Thursday, October 29, 7:00 p.m. to 9:00 p.m.; Friday, October 30, 8:00 a.m. to 5:00 p.m.; and Saturday, October 31, 8:00 a.m. to 3:00 p.m. Co-sponsor: Structural Geology and Tectonics Division

Directed toward earth-science professionals—college-level instructors and practicing geologists—this course will review the types of near-surface displacements by normal, reverse, and strike-slip faults and by folds, the geology of the earthquake source region, and how a geologist should view seismological data. Also covered will be slip-rate and recurrence-interval determination, the identification of paleo-earthquakes, and Quaternary dating techniques, including scarp degradation. The course will conclude with a discussion of how earthquake-related data should be treated and how geologists should interact with both engineers and the general public.

Faculty: *Robert S. Yeats*, Dept. of Geology, Oregon State University; Ph.D., University of Washington. Yeats has studied active reverse faults and folds in southern California, New Zealand, and the Himalayas. *Clarence R. Allen*, Div. of Geological & Planetary Science, California Institute of Technology; Ph.D., California Institute of Technology. Internationally well known, Allen has been carrying out field studies of major active fault systems of the world and their relation to local seismicity patterns and to problems of seismic hazard. *Kerry E. Sieh*, Div. of Geological & Planetary Science, California Institute of Technology; Ph.D., Stanford. Sieh is currently studying the geologically recent behavior of the San Andreas fault system in California and the neotectonics of southern China. *Richard H. Sibson*, Dept. of Geological Sciences, University of California, Santa Barbara; Ph.D., University of London. Sibson's research concerns the deep structure of fault zones, particularly as it pertains to the origin of shallow crustal earthquakes. He is the author of *Earthquakes and Rock Deformation in Crustal Fault Zones* (Annual Reviews of Earth and Planetary Sciences, 1986, vol. 14). *David B. Nash*, Dept. of Geology, University of Cincinnati; Ph.D., University of Michigan. Nash has more than 10 years experience in the field of scarp dating and hillslope modeling.

Fee includes course manual and dinner Friday evening. Limit: 75. Fee: \$150.

# GSA Divisions and Sections 1987

## DIVISIONS

GSA's ten specialty divisions provide a focus for members interested in a particular discipline. The divisions hold annual business meetings in conjunction with the Society's annual meeting, and each division publishes a newsletter periodically. Division membership totals are as of December 31, 1986.

**Archaeological Geology** Members: 496  
*Officers:* John A. Gifford, chairman; Fekri A. Hassan, first vice-chairman; Tjeerd H. Van Andel, second vice-chairman; Vance T. Holliday, secretary-treasurer; Charles J. Vitaliano, past chairman

**Coal Geology** Members: 468  
*Officers:* Daniel J. Casagrande, chairman; Frederick J. Kuellmer, first vice-chairman; Peter J. McCabe, second vice-chairman; James C. Cobb, secretary; C. Blaine Cecil, past chairman

**Engineering Geology** Members: 1,210  
*Officers:* Christopher C. Mathewson, chairman; Ellis L. Krinitzsky, chairman-elect; Thomas L. Holzer, secretary; David M. Cruden, past chairman

**Geophysics** Members: 741  
*Officers:* Bryan L. Isacks, chairman; Mary Lou Zoback, first vice-chairman; Kim D. Klitgord, second vice-chairman; William D. MacDonald, secretary-treasurer; William E. Bonini, past chairman

**History of Geology** Members: 434  
*Officers:* William M. Jordan, chairman; Leo F. LaPorte, first vice-chairman; Clifford M. Nelson, second vice-chairman; Michele L. Aldrich, secretary-treasurer; J. Thomas Dutro, Jr., past chairman

**Hydrogeology** Members: 1,596  
*Officers:* Wayne A. Pettyjohn, chairman; John M. Sharp, Jr., first vice-chairman; Robert N. Farvolden, second vice-chairman; Darryll T. Pederson, secretary-treasurer; William Back, past chairman

**Planetary Geology** Members: 466  
*Officers:* Arden L. Albee, chairman; James W. Head III, first vice-chairman; Raymond E. Arvidson, second vice-chairman; Ted A. Maxwell, secretary-treasurer; Victor R. Baker, past chairman

**Quaternary Geology and Geomorphology** Members: 1,392  
*Officers:* Victor R. Baker, chairman; James C. Knox, first vice-chairman; Dale F. Ritter, second vice-chairman; Richard F. Madole, secretary; Gail M. Ashley, past chairman

**Sedimentary Geology** Members: 975  
*Officers:* Robert Raymond, Jr., chairman; Juergen Reinhardt, first vice-chairman; Joanne Bourgeois, second vice-chairman; Robert H. Osborne, secretary-treasurer; George deVries Klein, past chairman

**Structural Geology and Tectonics** Members: 2,240  
*Officers:* John H. Spang, chairman; Gregory A. Davis, first vice-chairman; Arthur W. Snoke, second vice-chairman; George H. Davis, secretary-treasurer; Winthrop D. Means, past chairman

## SECTIONS

GSA has six regional North American sections, generally including GSA members who live within the geographical limits of each section. (Members who live in one section but have a professional interest in another section can become members of the section of interest.) Each section holds annual technical and business meetings. The number of voting members shown for each section is as of December 31, 1986.

**Cordilleran** Voting members: 3,414  
Geographic area: Alaska, Arizona south of lat 35°N, California, Hawaii, Nevada, Oregon, Washington, British Columbia, Yukon, Northwest Territories  
*Officers:* Warren B. Hamilton, chairman; vice-chairman to be elected at the 1987 Section Meeting; Bruce A. Blackerby, secretary; J. Lawford Anderson, past chairman

**Rocky Mountain** Voting members: 2,049  
Geographic area: Arizona north of lat 35°N, Colorado, Idaho, Montana, New Mexico, North Dakota, South Dakota, Utah, Wyoming, Alberta, Saskatchewan  
*Officers:* Paul K. Link, chairman; William R. Hackett, vice-chairman; Kenneth E. Kolm, secretary; Mary J. Kraus, past chairman; Edwin E. Larson, past vice-chairman

**North-Central** Voting members: 1,147  
Geographic area: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, Wisconsin, Manitoba, Ontario west of 89th meridian  
*Officers:* Arthur E. Burford, chairman; Lindgren L. Chyi, vice-chairman; Richard A. Hoppin, secretary; Peter J. Hudleston, past chairman; Robert E. Sloan, past vice-chairman

**South-Central** Voting members: 1,520  
Geographic area: Arkansas, Kansas, Oklahoma, Texas  
*Officers:* Rena M. Bonem, chairman; Ernest E. Angino, vice-chairman; Page C. Twiss, secretary-treasurer; John D. McFarland III, past chairman

**Northeastern** Voting members: 2,092  
Geographic area: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, New Brunswick, Newfoundland, Nova Scotia, Prince Edward Island, Quebec, Ontario east of the 89th meridian  
*Officers:* Peter Robinson, chairman; Donald B. Potter, vice-chairman; Kenneth N. Weaver, secretary; Harold W. Borns, Jr., past chairman

**Southeastern** Voting members: 1,528  
Geographic area: Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia  
*Officers:* Dennis N. Bearce, chairman; William H. Kanes, vice-chairman; Michael J. Neilson, secretary-treasurer; Walter H. Wheeler, past chairman; Randall S. Spencer, past vice-chairman

# Call For Submissions of

# YOUR GEOLOGIC PHOTOS

Your geologic photography can be part of a unique, quality photo publication.

**G**SA invites photographic submissions from individuals and organizations throughout the earth-science community for a unique volume of 100 colorful, geologic photo essays. The volume will be of the highest quality, featuring full-color photography accompanied by brief texts. It will be marketed to the scientific community, and to the general public as well.

Photo submissions for this volume should tell an interesting geologic story with a minimum of accompanying text, and should depict the beauty of the geology in our environment, including space, and/or the beauty inherent in the earth sciences.

Each suite of photos selected for the volume will be presented in a two-page layout: a feature photo in large format and full color, an accompanying brief text, and from one to six smaller photos expanding or explaining the geology of the feature photo. Some auxiliary photos will be black and white, others color.

## SUBMISSION REQUIREMENTS

**General:** Multiple submissions are permitted, but each submission must include all materials described below.

**Photos:** Photos must be of high technical quality, tell an interesting geologic story, and express the beauty of our environment and/or the earth sciences.

For each submission, designate a central photo, *which must be in color*. Supply two to six auxiliary photos, in color or black and white, which further explain or amplify the geology depicted in the feature photo.

For color photos, submit one positive color transparency (slide), originals preferred; prints cannot be used. For each black and white photo, submit one 8" x 10" black and white print on double-weight, smooth, nonglossy paper.

**Descriptive Text:** Submit a manuscript of a short explanatory text, type double-spaced. The manuscript should be at least one double-spaced page in length, but no longer than two double-spaced pages. Write the text so that it can be understood by both scientists and nonscientists.

**Address & Deadline:** Send all submissions to:  
J. Clark  
Geological Society of America  
3300 Penrose Place  
P.O. Box 9140  
Boulder, CO 80301

Submissions should be sent as early as possible, but no later than September 30, 1987—no extensions! Use the street address for express package services; use the box number for U.S. mail.



# MEETINGS

(Asterisk indicates new or changed information)

1987

**National Association of Geology Teachers Eastern Section Annual Meeting and Field Trips**, May 1-3, 1987, Stone Ridge, New York. Information: Lawrence R. Matson, Dept. of Geology, Ulster County Community College, Stone Ridge, NY 12484; (914) 687-7621, ext. 371.

**Canadian Institute of Mining and Metallurgy 89th Annual Meeting**, May 3-7, 1987, Toronto, Ontario. Information: Ivana Savic, CIM, 1130 Sherbrooke St. W., Suite 400, Montreal, Quebec H3A 2M8, Canada; (514) 842-3461.

**Analysis of Naturally Fractured Reservoirs**, May 4-8, 1987, Snowbird, Utah. Information: Jane Rider, AAPG Education Dept., P.O. Box 979, Tulsa, OK 74101-0979; (918) 584-2555.

**10th Annual Spring Systematics Symposium**, Evolutionary Ideas of Progress, May 9, 1987, Chicago, Illinois. Information: Matthew H. Nitecki, Field Museum of Natural History, Roosevelt Rd. at Lakeshore Dr., Chicago, IL 60605-2496; (312) 922-9410.

**Institute on Lake Superior Geology Annual Meeting**, May 11-14, 1987, Wawa, Ontario. Information: E. D. Frey, P.O. Box 57, Wawa, Ontario P0S 1K0, Canada; (705) 856-4883.

**Geology of Industrial Minerals, 23rd Annual Forum**, May 11-15, 1987, North Aurora, Illinois. Information: James W. Baxter, Illinois State Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820; (217) 333-5107.

**Coastal Sediments '87**, May 12-14, 1987, New Orleans, Louisiana. Information: Nicholas C. Kraus, USAE Waterways Experiment Station, Coastal Engineering Research Center, P.O. Box 631, Attn. WESCR-P, Vicksburg, MS 39180-0631.

**Geologic Hazards Symposium**, May 12-17, 1987, Anchorage, Alaska. Information: William Pyle, 1987 Geologic Hazards Symposium, Box 101288, Anchorage, AK 99510.

**Midwest Friends of the Pleistocene Annual Meeting**, May 15-17, 1987, Mansfield, Ohio. Information: John P. Szabo, Dept. of Geology, University of Akron, Akron, OH 44325; (216) 375-7630.

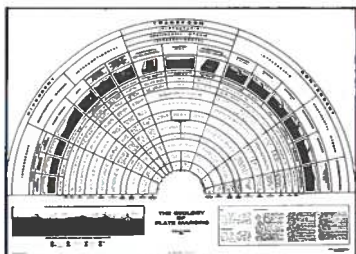
**American Geophysical Union Spring Meeting**, May 18-22, 1987, Baltimore, Maryland. Information: Ann E. Singer, American Geophysical Union, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

**International Geoscience and Remote Sensing Symposium**, May 18-21, 1987, Ann Arbor, Michigan. Information: Joan Eadie, Secretariat, University of Michigan Extension Service, Dept. of Conferences and Institutes, 200 Hill St., Ann Arbor, MI 48104-3297.

**Coastal Lowlands Symposium: Geology and Geotechnology**, May 25-27, 1987, The Hague, Netherlands. Information: Coastal Lowlands Symposium, c/o CONGREX, Keizersgracht 610, 1017 EP Amsterdam, Netherlands; Telex NL-14527.

(continued on p. 109)

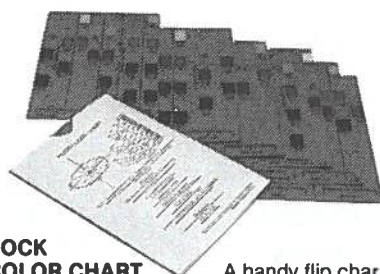
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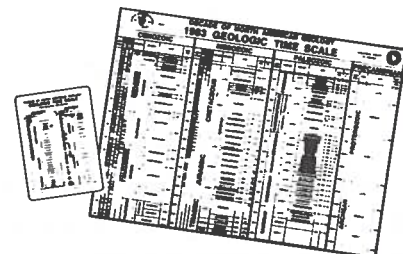
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**Meetings (continued)**

**Geological Association of Canada-Mineralogical Association of Canada Annual Meeting**, May 25-27, 1987, Saskatoon, Saskatchewan. Information: W. O. Kupsch, Dept. of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan S7N 0W0, Canada; (306) 966-5696.

**28th U.S. Symposium on Rock Mechanics**, June 29-July 1, 1987, Tucson, Arizona. Information: 28th U.S. Symposium on Rock Mechanics, Special Professional Education, Box 9, Harvill Bldg., University of Arizona, Tucson, AZ 85721; (602) 621-5104 or 621-3054.

**Society of Professional Well Log Analysts 28th Annual Symposium**, June 29-July 3, 1987, London, England. Information: SPWLA Symposium, c/o The Geological Society, Burlington House, Piccadilly, London W1V 0JU, England.

**First International Congress, Geochemistry and Cosmochemistry**, June 30-July 6, 1987, Paris, France. Information: C. J. Allegre, Lab. de Géochimie et Cosmochimie, 4 place Jussieu, Tour 14, 3 étage, 75252 Paris Cedex, France; telephone 43.54.84.63.

**Growth of Continental Crust** workshop, July 13-17, 1987, Oxford, England. Information: Pamela Jones, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, TX 77058.

**Second Symposium on the South Atlantic Evolution**, July 23-25, 1987, Rio de Janeiro, Brazil. Information: Dimas Dias-Brito, Ilha do Fundão, Quadra 7, Rio de Janeiro - 21.910 - Brazil; and P. Y. Berthou, Lab. de Géologie des Bassins Sédimentaires, Tour 14-15, 4 étage, 4 place Jussieu, 75252 Paris Cedex 05, France.

**Tectonic Setting of Layered Intrusives**, July 27-28, 1987, Pretoria, South Africa. Information: Secretary, Indaba Organising Committee, Dept. of Geology, University of Pretoria, Pretoria, South Africa.

**4th International Congress of the Regional Committee on Pacific Neogene Stratigraphy** (affiliated with IUGS) and joint meeting of **IGCP Project 246**, July 29-31, 1987, Berkeley, California. Information: Charlotte Brunner, Chairperson of Organizing Committee, Dept. of Paleontology, University of California, Berkeley, CA 94720.

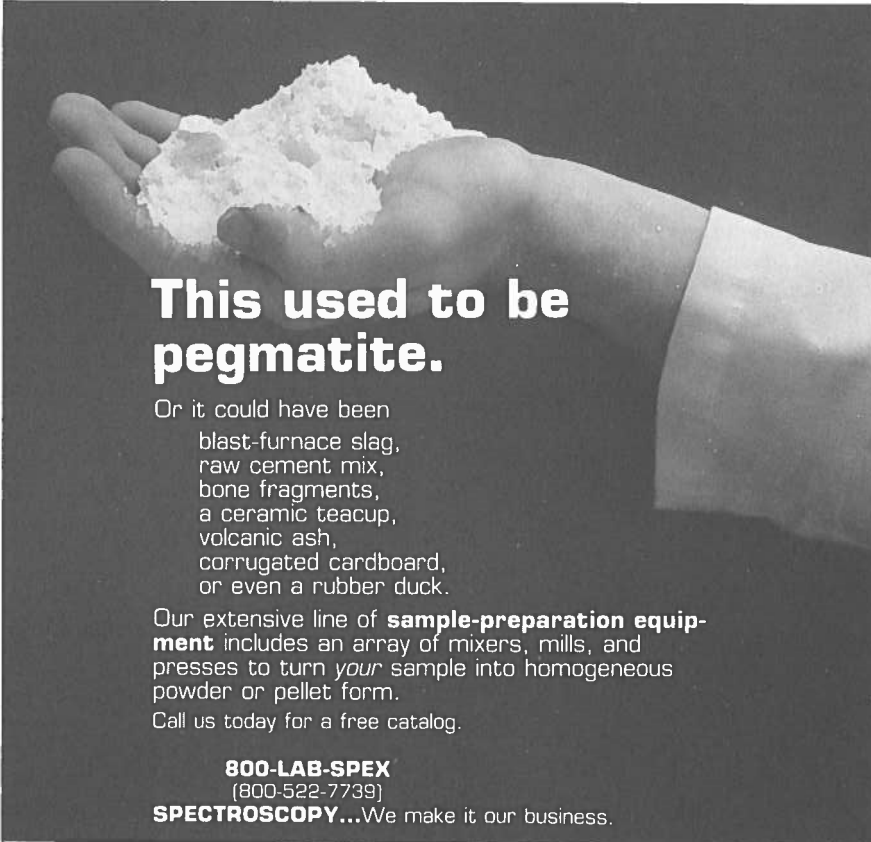
**International Union for Quaternary Research (INQUA) 12th Congress**, July 31-August 9, 1987, Ottawa, Ontario, Canada. Information: Alan V. Morgan, Dept. Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.

**5th Magmatic Sulphide Field Conference**, August 3-13, 1987, Zimbabwe. Information: A. Martin, Geological Society of Zimbabwe, P.O. Box 8427, Causeway, Harare, Zimbabwe.

**International Symposium on Erosion and Sedimentation in the Pacific Rim**, August 3-7, 1987, Corvallis, Oregon. Information: 1987 Corvallis Symposium, Conference Coordinator, College of Forestry, Oregon State University, Corvallis, OR 97331; (503) 754-2004.

**Devonian System 2nd International Symposium**, August 17-20, 1987, Calgary, Alberta. Information: Second International Symposium Devonian System, c/o Canadian Society of Petroleum Geologists, 505, 206 - 7th Ave. S.W., Calgary, Alberta T2P 0W7, Canada; (403) 264-5610.

(continued on p. 110)



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28

**Meetings** (continued from p. 109)

**7th International Conference on Basement Tectonics**, August 17–21, 1987, Kingston, Ontario, Canada. Information: Bob Mason, c/o Events Management Inc., 4 Catarqui St., Suite 209, Kingston, Ontario K7K 1Z7, Canada; (613) 547-5093.

**Society of Economic Paleontologists and Mineralogists Fourth Annual Midyear Meeting**, August 20–23, 1987, Austin, Texas. Information: SEPM, P.O. Box 4756, Tulsa, OK 74159; (918) 743-9765.

**XVI Pacific Science Congress**, August 20–30, 1987, Seoul, Korea. Information: Choon Ho Park, XVI Pacific Science Congress, K.P.O. Box 1008, Seoul 110, Korea; telephone (2) 733-4478; Telex ILSKOR 23881.

**International Symposium on Nonmarine Cretaceous Correlations**, August 25–30, 1987, Urumqi, China. Information: Shen Yanbin, Nanjing Institute of Geology and Paleontology, Nanjing, People's Republic of China; or Niall J. Mateer, 1467 N. 17th, Laramie, WY 82070.

**International Congress on Geology, Structure, Mineralization, and Economics of the Pacific Rim**, August 26–29, 1987, Queensland, Australia. Information: C/-Aus. IMM Congress Secretariat, P.O. Box 731, Toowong 4066, Queensland, Australia.

**Sixth International Congress on Rock Mechanics**, August 31–September 3, 1987, Montreal, Quebec, Canada. Information: J. Franklin, Dept. of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.

**Third International Symposium on Observation of the Continental Crust through Drilling**, September 7–10, 1987, Mora and Orsa, Sweden. Information: Deep Drilling in Crystalline Bedrock, c/o Stockholm Convention Bureau, Box 6911, S-10239 Stockholm, Sweden.

**XI International Congress of Carboniferous Stratigraphy and Geology**, September 7–11, 1987, Beijing, China. Information: Yang Jingzhi, Nanjing Institute of Geology and Paleontology, Academia Sinica, Nanjing, China.

**International Workshop on Computerized Basin Analysis**, September 7–12, 1987, Szeged, Hungary. Information: Laszlo Somos, Geological Survey of Hungary, Pf. 106, H-1442, Budapest, Hungary; telephone (36-1) 634 431; Telex 225 220 mafi h.

**International Symposium on the Terminal Precambrian and Cambrian Geology**, September 8–14, 1987, Yichang, China. Information: Wang Xiaofeng, secretariat, Yichang Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences, P.O. Box 502, Yichang, Hubei, China.

**American Association of Petroleum Geologists Rocky Mountain Section** meeting, September 13–16, 1987, Boise, Idaho. Information: David H. Hawk, J.R. Simplot Co., 999 Main St., Boise, ID 83707; (208) 336-2110.

**18th Annual Geomorphology Symposium on Catastrophic Flooding**, September 26–28, 1987, Oxford, Ohio. Information: Larry Mayer, Dept. of Geology, Miami University, Oxford, OH 45056; (513) 529-3218.

**International Conference on Geophysical and Geochemical Exploration for Minerals and Groundwater**, September 27–October 1, 1987, Toronto, Ontario. Information: Exploration '87, c/o 222 Snidercroft Rd., Concord, Ontario L4K 1B5, Canada; (416) 669-2280; Telex 06-964570.

**Fifth International Flint Symposium**, September 27–October 2, 1987, Bordeaux, France. Information: 5th International Flint Symposium, Secrétaire General, c/o Michel Lenoir, Institut du Quaternaire, Batiment de Géologie, Avenue des Facultés, Université de Bordeaux I, 33405 Talence Cedex, France.

**National Association of Geology Teachers Far Western Section Fall Conference**, October 2–4, 1987, Hayward, California. Information: Elwood Brooks, Dept. Geological Sciences, California State University, Hayward, CA 94542; (415) 881-3486.

**Troodos 87: Ophiolites and Oceanic Lithosphere**, October 5–10, 1987, Nicosia, Cyprus. Information: Troodos 87 Symposium, Geological Survey Dept., Nicosia, Cyprus.

**Society of Economic Paleontologists and Mineralogists Great Lakes Section Annual Meeting** and fall field trip, October 9–11, 1987, southern Indiana. Information: J. R. Dodd, Dept. of Geology, Indiana University, Bloomington, IN 47405; (812) 335-5322 or 5581.

**Geothermal Resources Council Annual Meeting**, October 12–16, 1987, Sparks, Nevada. Information: Geothermal Resources Council, P.O. Box 1350, Davis, CA 95617-1350; (916) 758-2360.

**Mathematical Methods in Geology**, 16th Annual Geochautauqua, October 12–16, 1987, Pribiam, Czechoslovakia. Information: V. Nemeč, Geoindustria, Geologicka 2, 152 00 Praha 5, Barrandov, Czechoslovakia; telephone (42-2) 590228 or (42-2) 7811801.

**Indiana Geological Survey Sesquicentennial Celebration**, October 15–16, 1987, New Harmony, Indiana. Information: Robert H. Shaver, Indiana Geological Survey, 611 North Walnut Grove, Bloomington, IN 47405; (812) 335-7428.

(continued on p. 111)

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Meetings (continued)

**Society of Economic Paleontologists and Mineralogists Gulf Coast Section 8th Annual Research Conference**, Paleontological Applications in Petroleum Exploration, December 6-9, 1987, Houston, Texas. Information: Charles L. McNulty, Dept. of Geology, University of Texas, UTA Box 19049, Arlington, TX 76019; (817) 273-2979.

**American Geophysical Union Fall Meeting**, December 7-11, 1987, San Francisco, California. Information: Ann E. Singer, American Geophysical Union, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

**First Arab Conference on Geological Education**, December 12-14, 1987, Baghdad, Iraq. Information: Conference Secretariat, Arab Conference on Geological Education, Arab Geologist Association, P.O. Box 1247, Baghdad, Iraq; Telex 212197 JAMIT IK.

**GSA 1987**

**Section Meetings**

Rocky Mountain Section, May 2-4, 1987, Boulder, Colorado  
Cordilleran Section, May 20-22, 1987, Hilo, Hawaii

**Annual Meeting**, October 26-29, 1987, Phoenix, Arizona

**Penrose Conferences**

**The Construction of Geological Cross Sections: Techniques, Assumptions, and Methods**, May 3-8, 1987, Rosendale, New York. Information: Peter A. Geiser, Dept. of Geology and Geophysics, University of Connecticut, Storrs, CT 06268; (203) 486-4432 or 4433.

**Glacial Facies Models**, May 3-8, 1987, Scarborough, Ontario. Information: Nicholas Eyles, Dept. of Geology, Scarborough Campus, University of Toronto, Scarborough, Ontario M1C 1A4, Canada; (416) 284-3336.

**Geological Decisions for the 21st Century**, July 12-17, 1987, Steamboat Springs, Colorado. Information: David A. Stephenson, Dames & Moore, Pointe Corporate Centre, 7500 North Dreamy Draw Dr., Suite 145, Phoenix, AZ 85020; (602) 371-1110.

**Paleoenvironmental Interpretation of Paleosols**, September 11-17, 1987, Warm Springs Indian Reservation, Oregon. Information: Greg Retallack, Dept. of Geology, University of Oregon, Eugene, OR 97403-1272; (503) 686-4573.

**Cordilleran Metamorphic Core Complexes, Revisited: Implications for Crustal Extension and Shortening in the North American Cordillera**, September 13-18, 1987, Elko, Nevada. Information: Arthur W. Snoke, Dept. of Geology and Geophysics, University of Wyoming, P.O. Box 3006, Laramie, WY 82071; (307) 766-5457.

**Exposed Cross Sections Through the Continental Crust**, September 27-October 2, 1987, Killarney, Ontario, Canada. Information: David M. Fountain, Dept. of Geology and Geophysics, University of Wyoming, P.O. Box 3006, University Station, Laramie, WY 82071.

**1988**

**V. M. Goldschmidt Conference** for geochemistry, May 11-13, 1988, Baltimore, Maryland. Information: Goldschmidt Conference Coordinator, Pennsylvania State University, 410 Keller Bldg., University Park, PA 16802. (*Abstracts due December 18, 1987.*)

**\*Sixth Thematic Conference on Remote Sensing for Exploration Geology**, May 16-19, 1988, Houston, Texas. Information: Thematic Conference, Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107; (313) 994-1200, ext. 3382; Telex 4940991 ERIMARB.

**American Geophysical Union Spring Meeting**, May 16-20, 1988, Baltimore, Maryland. Information: Ann E. Singer, American Geophysical Union, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

**Bicentennial Gold 88**, May 16-20, 1988, Melbourne, Australia. Information: R. R. Keays, Dept. of Geology, University of Melbourne, Parkville, Victoria 3052, Australia; telephone (03) 345 1844; Telex AA35185. (*Abstracts due September 30, 1987.*)

**Geological Association of Canada-Mineralogical Association of Canada-Canadian Society of Petroleum Geologists Joint Annual Meeting**, May 22-25, 1988, St. John's, Newfoundland. Information: John Fleming, Newfoundland Dept. of Mines and Energy, P.O. Box 4750, St. John's, Newfoundland A1C 5T7, Canada; (709) 576-2768.

**Case Histories in Geotechnical Engineering 2nd International Conference**, June 1-5, 1988, St. Louis, Missouri. Information: Shamsheer Prakash, Room 308, Dept. of Civil Engineering, University of Missouri, Rolla, MO 65401; (314) 341-4461.

**Seismic Probing of the Continents and Their Margins International Symposium**, July 6-8, 1988, Canberra, Australia. Information: Jim Leven, Bureau of Mineral Resources, P.O. Box 378, Canberra, ACT 2601, Australia; telephone (062) 499111; Telex AA62109.

**Permafrost 5th International Conference**, August 2-5, 1988, Trondheim, Norway. Information: V International Conference on Permafrost, Norwegian Institute of Technology, Studies Administration, N-7034 Trondheim-NTH, Norway.

**International Symposium on Engineering Geology: Study, Preservation and Protection of Ancient Works, Monuments and Historical Sites**, September 19-23, 1988, Athens, Greece. Information: Paul G. Marinos, Greek Committee of Engineering Geology, 1988 Symposium Secretariat, P.O. Box 19140, GR-117 10 Athens, Greece; Telex 45 4312 POLX.

**American Geophysical Union Fall Meeting**, December 5-9, 1988, San Francisco, California. Information: Ann E. Singer, American Geophysical Union, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

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**DELEUW, CATHER AND COMPANY**, a member of the joint venture assigned to manage construction of the Los Angeles Metro Rail Rapid Transit System will have an opening for an Engineering Geologist in the July-August time frame. The position requires a degree in Geology, Engineering Geology or Geological Engineering, and a minimum of five years experience in borehole logging and mapping of geology revealed by construction. Associated experience in observing mined tunnels and monitoring geotechnical instrumentation is highly desirable. Preference will be given to the candidate who is California certified—or working toward certification—as an Engineering Geologist. Salary commensurate with education and experience. Firm offer of employment is subject to client approval. Send resume in confidence to: Charles W. Daugherty, DeLeuw, Cather and Company, c/o PDCD, 600 South Spring Street, Los Angeles, California 90014.

#### WHITMAN COLLEGE

The Department of Geology at Whitman College in southeastern Washington seeks a sabbatical replacement for 1988-89. Four courses are to be taught, including tectonics/structural geology, mineralogy, and igneous/metamorphic petrology. Priority for the fourth course is geological oceanography (for nonmajors) or geophysics. Applications should be mailed, ideally in September 1987, to R.J. Carson, Whitman College, Walla Walla, WA 99362. Candidates must provide evidence of excellent teaching ability and should arrange to have three confidential letters sent. The Department of Geology has excellent teaching and research equipment, and conducts a laboratory and field-oriented program for undergraduate geology majors. Whitman is a liberal arts college located on the Columbia Plateau adjacent to the Blue Mountains. The College is an equal opportunity/affirmative action employer.

#### PROFESSORSHIP IN ENERGY RELATED GEOSCIENCE

Department of Geology  
Louisiana State University

Louisiana State University is seeking an individual with an established reputation in some research specialty critical to the search for fossil fuels to fill the Charles T. McCord, Jr. Endowed Professorship.

We invite applications from all qualified scientists, but we are particularly interested in finding a scientist with academic and industry or consulting experience who wants to establish a research and teaching program in a diverse and growing earth science community. Applicants should have an enthusiasm for teaching their specialty, and an ability to acquire and sustain support for their research programs. Rank is at the Full Professor level with salary competitive with other special professorships at Louisiana State and at other research universities.

The department of Geology, the Coastal Studies Institute, and the Basin Research Institute form the School of Geoscience. The Louisiana Geological Survey is located in the same complex and closely associated with the Department and the Institutes. These groups share 110,000 square feet of space in two buildings, one new in 1987. Current research in the Department, the Institutes, and the Survey includes efforts in nearly all aspects of earth science. There are over 30 teaching faculty in the Department. Re-

view of applications will begin June 1, 1987 and continue until a suitable applicant is found.

Applicants should send their vita, the names of three scientists familiar with their work, and a letter describing their research and teaching interests to Professor Joseph E. Hazel, Chairman, McCord Professorship Search Committee, Department of Geology, Louisiana State University, Baton Rouge, LA 70803-4101. All application materials will be held in confidence. LSU is an equal-opportunity/affirmative action employer.

#### SR. HYDROGEOLOGIST

A growing consulting firm seeks a Sr. Hydrogeologist to manage Geosciences Department in Cherry Hill, NJ location. Position involves planning and supervising work plans, field investigations, groundwater well installations, and extensive client and staff development.

The qualifying candidate should have an advanced degree and up to 8 years applicable experience. Position also requires knowledge of designing and managing RI/FS type site investigations, good communication and writing skills, plus ability to travel. Professional registration, preferably in Delaware, a plus. Interested candidates should forward resume to: Elizabeth S. Knight, Director of Personnel, HART Environmental Management Corp., 530 Fifth Avenue, New York, NY 10036. An equal opportunity employer.

#### FACULTY POSITION

Field: Igneous and Metamorphic Petrology, Mineralogy; with an emphasis on the interrelationship between field and laboratory aspects. Available: August, 1988.

Beloit College seeks a recent Ph.D. for an Assistant Professor, tenure track position. This is a special opportunity because it allows the individual to phase into fulltime teaching and advising over a period of four years. The remainder of the individual's time will be used to set up and organize an active research program involving undergraduate students.

Interest in the concept of "liberal arts" undergraduate education is essential and may allow for the teaching of a course which bridges the field of Geology with other related fields.

Letter of application should be accompanied by resume, all transcripts and three confidential letters of recommendation sent to: Professor Richard C. Stenstrom, Department of Geology, Beloit College, Beloit, Wisconsin 53511. Application deadline: 1 October 1987. Beloit College is an equal opportunity and affirmative action employer.

#### SEATTLE AREA FOR YOU?

Project Manager position to lead remedial investigations in Western U.S. and Alaska. Job responsibilities include field program design and oversight, data interpretation, project management and cost control. Must be capable of directing two to three projects simultaneously, including oversight of field supervisor(s), 4 to 10 staff, and support subcontractors. Project budgets range from \$0.2M to more than \$1M. Business development responsibilities in six months. PhD or MS in Geology, Soils Science, or Hydrogeology plus 6 to 12 years experience. Describe training/experience in groundwater movement, hydrogeochemistry, organic chemistry, and geophysics with specific applicability to CERCLA and/or RCRA implementation. Contracts experience desirable. Projects may require 25 to 50% travel during peak of field efforts. One position in Seattle area; possible second in San Francisco area. Send resume and salary history/expectation to: Personnel, Science Applications International Corporation, 13400-B Northrup Way, Suite 38, Bellevue, Washington 98005.

#### KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH

Kuwait Institute for Scientific Research (KISR) is a

nonprofit organization with a staff of more than one thousand employees engaged in applied research in the fields of environmental and earth sciences; food resources; engineering; petroleum, petrochemicals and materials and technoeconomics. KISR has vacancies for:

#### Senior Hydrogeologist

*Major duties:* (1) Conducting and supervising research projects in hydrogeology and ground water in arid environments. (2) Initiating and following up proposals aimed at securing research contracts with government and private agencies. *Qualification:* Applicants should have a PhD in Geology or Civil Engineering, majoring in Ground Water Hydrology and 10 years of relevant experience including field experience in regional hydrogeologic studies and ground water resources assessment. Applicants must also have strong writing and communication skills and previous experience in the artificial ground water recharge practice, ground water recharge and water balance studies, and ground water quality including contamination. Experience in geophysical applications to ground water and knowledge of the Arabic language is an asset.

#### Hydrogeologist

*Major duties:* Participating in field, office and laboratory research work in hydrogeology in urban and desert environments. *Qualification:* Applicants should have a MSc or PhD in Geology or Civil Engineering with a major in Ground Water Hydrology and 5 or more years of relevant experience, including field experience in well and aquifer pumping tests, design and construction of monitoring and production wells, analysis of hydrogeologic data pumping test records and sampling. Strong writing and communication skills and knowledge of the Arabic language is an asset.

KISR offers attractive tax free salaries commensurate with qualifications and experience and generous benefits which include gratuity, free furnished airconditioned accommodation, school tuition fees for children, contribution to a savings plan, six weeks annual paid vacation, airtickets, free medical care and life insurance.

Interested applicants are requested to send their Curriculum Vitae with supporting information not later than one month of this publication, to: Mr. Habeeb Al-Sahhaf, Personnel Manager, Kuwait Institute for Scientific Research, P.O. Box 24885 Safat, 13109 Safat, KUWAIT.

#### HYDROGEOLOGIST AND CIVIL ENGINEERS

**Dames & Moore.** Experienced, mature, professional hydrogeologists having strong project management and communication skills. Strong background in applied hydrogeology integrated with engineering and chemistry. M.S. degree in hydrogeology or related field with three to seven years experience. Registration as Professional Geologist or P.E. desirable. Responsibilities range from field sampling program through project management and technical supervisory duties, including RCRA, CERLA planning and management, groundwater quantity and quality monitoring and modeling, remedial action evaluation water supply well design and testing, aquifer restoration and groundwater management.

Positions in our Sacramento, San Francisco and Santa Barbara offices. Salary commensurate with experience.

Send resume to: Dames & Moore, 3050 Beacon Blvd., #205, W. Sacramento, CA 95691. A.A./EOE.M/F/#/IV

**ESE, a full service environmental consulting firm** with 13 offices nationwide, currently has the following position available:

#### GROUNDWATER HYDROLOGIST

Experienced senior level project hydrologists needed to manage projects in site investigations, hazardous waste feasibility studies, industrial waste problems, etc. Skills needed in technical area, project management, marketing, budgeting, and client interaction. Position requires a B.S. and minimum of 6 years related experience in groundwater

assessments and remediation. Experience with CERCLA and RCRA is highly desirable. Previous consulting and experience in the computer modeling of aquifer characteristics and contaminant migration is also preferred. Interested applicants who satisfy these requirements should submit their resume and geographical preferences to: Environmental Science and Engineering, Inc., Dept.: GS87, P.O. Box ESE, Gainesville, FL 32602.

**NUS CORPORATION** is a leading consultant to government and industry in the environmental, safety, and health protection fields. The NUS Savannah River Center, Aiken, S.C., has immediate openings for engineers and scientists with experience in the waste management field.

**Geohydrologist:** Geohydrology, geology, hydrology, or civil engineering degree. MS preferred. Demonstrated ability to characterize hydrogeological environment, to assess groundwater impacts of construction and operation of industrial facilities, to assess groundwater contamination remedial action, and to perform geohydrological evaluations and contaminant transport modeling in support of environmental assessments and regulatory requirements, especially those related to RCRA and CERCLA. At least 5 years experience preferred.

**Hazardous Waste Engineer:** Civil, mechanical, chemical, or environmental engineering degree or geological sciences degree. At least 3 years experience in RCRA compliance required; additional CERCLA experience preferred. Demonstrated ability to review and evaluate engineering feasibility studies and remedial action plans and to review permit applications for solid, hazardous, and mixed waste facilities.

U.S. citizenship is required for these positions. If you meet the qualifications and are interested in working with a team of dedicated professionals, send your resume in confidence to: NUS Corporation, Attention: C.G. Mattsson, Savannah River Center, 37 Varden Drive, Aiken, SC 29801.

#### OAK RIDGE NATIONAL LABORATORY

A geologist with a background in stratigraphy and experience in fractured reservoir analysis is needed to work on projects associated with disposal of nuclear wastes; there are currently two projects for which a person is sought. ORNL is involved in assessment of sedimentary rocks in support of efforts to study siting methods for geologic disposal of high level nuclear waste. Also, ORNL is characterizing the structural and hydrologic nature of fractured, low-permeability strata that have been used for subsurface injection of waste materials under elevated pressure. The position requires a person with extensive knowledge of stratigraphic systems, preferably on a regional basis, and the ability to test, characterize, and model a fractured reservoir. The successful candidate must have a graduate degree and must be able to work in a group situation with other scientists (hydrologists, geologists, geochemists) and engineers. Please contact: Stephen H. Stow, P.O. Box X, Oak Ridge National Laboratory, Oak Ridge, TN 37831.

#### ENGINEERING

International Technology Corporation, a recognized leader in the management of hazardous waste has immediate openings for the following professional positions at its Irvine, California location.

**Hydrogeologist/Geologist.** Entry level position with 2 years field experience. BS degree in Geology or related technical discipline. Senior level with minimum 5 years field hydrogeology/geology or related technical experience. Ability to develop and manage customer monitoring activities, ensure regulatory compliance and interface well with agencies. Geology registration (or eligibility) preferred but not required. **Civil Engineers.** Entry level with minimum 3 years field experience with civil works and subsurface installations. MS degree. Senior level with minimum 5 years field experience. License is required.

If you meet these qualifications, are willing to relocate to Southern California and would like to join a progressive growing professional organization offering an excellent benefits package and competitive salary, please submit resume and salary requirements to: Human Resources, International Technology Corporation, 336 W. Anaheim Street, Wilmington, CA 90744. Equal Opportunity Employer.

**THE CENTER FOR NEOTECTONIC STUDIES** of the Mackay School of Mines, University of Nevada-Reno, is conducting research to evaluate seismotectonic and geologic relationships in the southern Basin and Range Province. Our studies will support highly qualified students for Ph.D. and Masters research on the following topics: Quaternary Geology and Active Faulting, Geochemistry, Geomorphology, Hydrothermal Activity and Mineralization, Seismology, Neotectonics and Tectonics, Remote Sensing, Volcanic Geology and Geotechnical and Rock Mass Studies. Teaching Assistantships are also available in the Department of Geological Sciences. Send an application, official transcripts and three letters of recommendation to David B. Slemmons, Director of the Center for Neotectonic Studies, Mackay School of Mines, University of Nevada-Reno, Reno, Nevada 89557.

**THE CENTER FOR NEOTECTONIC STUDIES**, Mackay School of Mines, University of Nevada-Reno is offering a post doctoral position for research in Neotectonics and Tectonics in the southern Great Basin, in an area of possible listric, detachment, and strike-slip fault activity. We seek a person with outstanding research ability in Neotectonics studies and structural geology. Highly qualified applicants should submit an application, transcripts, three letters of recommendation to David B. Slemmons, Director, Center for Neotectonic Studies, Mackay School of Mines, University of Nevada-Reno, Reno, Nevada 89557.

#### FACULTY POSITION WITH THE EARTH SYSTEM SCIENCE CENTER THE PENNSYLVANIA STATE UNIVERSITY

The newly created Earth System Science Center in the College of Earth and Mineral Sciences invites applications and nominations for a tenure-track faculty position in Earth System Science. The research efforts of the Center will focus on a multidisciplinary view of the earth, necessary to understand the causes, processes and limits of variability of planetary change on scales of millions of years to decades or less. The multidisciplinary research center will integrate studies of the atmosphere, hydrosphere, cryosphere, biosphere and lithosphere and will include human interactions with the earth system. The Center seeks an outstanding, highly motivated individual on the forefront of research directed towards understanding the earth system, including past and present earth observations and theoretical and numerical modeling of the processes and interactions within the planetary system.

The successful candidate will have a tenure-track appointment with one of the academic Departments of Geosciences, Meteorology or Geography within the College. Rank and salary will be commensurate with qualifications. Review of applications and nominations will be accepted by June 15, 1987, or until a suitable candidate is identified. Nominations and supporting materials for applications should be submitted to: Eric J. Barron, Director, Earth System Science Center, 503F Deike Building, The Pennsylvania State University, University Park, PA 16802. An equal opportunity/affirmative action employer.

#### POSTDOCTORAL FELLOWS EARTH SYSTEM SCIENCE CENTER THE PENNSYLVANIA STATE UNIVERSITY

The Earth System Science Center at The Pennsylvania State University announces the beginning of its postdoctoral fellowship program. The Interdepartmental Earth System Science Center is

a leader in developing multidisciplinary research and education programs directed towards understanding planetary change on a variety of time scales, and in viewing the earth as a system of linked global processes. In association with the Departments of Geography, Geosciences and Meteorology, the Center seeks applications from highly motivated and creative individuals with strong multidisciplinary interests for appointments as post-doctoral fellows. Application deadline, June 15, or until suitable candidates are found. Applications and supporting materials with three names for reference should be forwarded to: Eric J. Barron, Director, Earth System Science Center, 537A Deike Building, P.O. Box 503A, The Pennsylvania State University, University Park, PA 16802. An equal opportunity/affirmative action employer.

#### GEOLOGICAL SCIENCES UNIVERSITY OF NEVADA

The Department has a 0.4 FTE State-funded faculty position open for an aggressive geoscientist capable of generating the equivalent of 0.6 FTE by means of grants and/or contracts. We are interested in response from scientists with teaching/research abilities in either of two fields. The position is open effective August 1, 1987. 1) Potential fields theory, including inverse theory application. Research interests in paleomagnetism desirable. 2) Low temperature/surficial processes geochemistry. Research interests in hydrogeology desirable.

Facilities available to support research/teaching in these and affiliated areas include: seismic, gravimetric, electrical fields, remote sensing and magnetic-paleomagnetic (spinner and cryogenic) equipment/laboratories; full analytical facilities including automated XRD, XRF, SEM, Electron Probe, AA and other spectrometers and access to stable isotope laboratories.

Interested scientists please submit letter of application, resume and names/addresses of three references to L.T. Larson, Chair, Dept. Geological Sciences, University of Nevada, Reno, NV 89557. The University is an affirmative action/equal opportunity employer. Closing date for Application is June 15, 1987.

#### GEOLOGISTS, HYDROGEOLOGISTS, ENGINEERS

Atlantic Environmental Services, Inc. is a growing firm located in Connecticut providing a spectrum of environmental consulting services to industrial and public-sector clients. Atlantic invites applicants with experience in or skills applicable to the following areas: Hazardous Waste Assessment, Remedial Investigation/Feasibility Studies, Ground Water Contamination Investigations, Ground Water/Unsaturated Zone Monitoring, Ground Water Development, Environmental Resource Evaluations.

Responsibilities include project management, field investigation, data collection and analysis, technical report and proposal preparation, client development, and public presentations. Strong technical, organizational, and written and oral communication skills as well as computer literacy are essential.

Interested applicants should submit a resume and references to: Dr. Laurence R. Lew, Atlantic Environmental Services, Inc., 8 Norwich Avenue, Colchester, CT 06415. All applications will be held in strict confidence. Atlantic is an equal opportunity employer.

#### HYDROGEOLOGIST (HAZARDOUS WASTE)

James M. Montgomery, Consulting Engineers, Inc., one of the nation's leading environmental firms, has an opening for a Hydrogeologist.

We are seeking a qualified individual with 2-4 years experience in site investigation, feasibility studies, and remedial design for contaminant mitigation of hazardous waste sites. An M.S. degree is desirable.

As an employee-owned firm with a reputation for engineering excellence, we offer a superior compensation package including liberal employee benefits and a growth-oriented environment.

For immediate consideration please send resume to: Roman M. Teixeira, Department H, James M. Montgomery, Consulting Engineers, Inc., P.O. Box 7009, Pasadena, CA 91109-7009. Equal Opportunity Employer M/F.

#### INDUSTRIAL MINERALS GEOLOGIST

The Nevada Bureau of Mines and Geology, invites applications for a full-time, State-funded, Tenure-Track position beginning July 1, 1987 to conduct research and perform public service related to Nevada industrial-minerals geology: An M.S. or Ph.D. in the earth sciences and a minimum of two years of mineral-resources geologic experience are required. Preference will be given to candidates with industrial minerals and/or state geological survey experience. The salary range is \$32,600-\$43,700. To apply contact John Schilling, Director, Nevada Bureau of Mines and Geology, University of Nevada-Reno, Reno, NV 89557-0088. Telephone: (702) 784-6691. Deadline: June 15, 1987. The University of Nevada-Reno is an AA/EEOE.

**THE SCHOOL OF GEOPHYSICAL SCIENCES,** Georgia Institute of Technology, is seeking highly qualified candidates for research positions in geophysics, seismology, or seismotectonics. We seek creative scientists who will develop strong research programs and will contribute to our Ph.D. program. We desire quantitative capabilities and experience. Also, the candidates' ability to work with other graduate programs of the Institute and to take advantage of research facilities at Georgia Tech will be considered. Salary and rank will be commensurate with experience and background. Call (404) 894-2860 for more information or send a resume and a brief description of research and teaching interests to: Geophysical Sciences Search Committee for Geophysics, School of Geophysical Sciences, Georgia Institute of Technology, Atlanta, Georgia 30332-0340.

The Georgia Institute of Technology is a unit of the University System of Georgia and is an equal opportunity employer. We encourage applications from qualified women and minorities.

#### STRATIGRAPHY/SEDIMENTOLOGY WRIGHT STATE UNIVERSITY

The Department of Geological Sciences invites applications for a one-year appointment at the assistant professor level, beginning September 1987.

Teaching duties will include graduate courses in stratigraphy and sedimentology as well as undergraduate courses in physical and historical geology. The ability to teach courses in glacial geology would be beneficial.

The Department currently has 13 full-time faculty and strong M.S. programs in geology with concentration on exploration geophysics and applied hydrogeology. Research facilities are excellent and remuneration is competitive.

The Ph.D. (A.B.D. considered) is required. Send resume, including letter of intent, and have three letters of reference forwarded to: Chair, Search Committee, Department of Geological Sciences, Wright State University, Dayton, OH 45435. Closing date June 1, 1987. Wright State University is an Affirmative Action/Equal Opportunity Employer.

#### RESEARCH GEOLOGIST/HYDROLOGIST University of Nebraska

The Conservation and Survey Division invites applications for the position of Research Geologist/Hydrologist at the Division sub-office located at Scottsbluff, Nebraska, beginning September 1. The minimum qualifications are a M.S. degree with appropriate experience in the utilization of stratigraphy and sedimentology, particularly as related to water resources. The successful applicant will be expected to: design and conduct individual research projects and supervise a professional level research program in stratigraphy and hydrogeology; participate in cooperative research projects with other Division staff, the Panhandle Research and Extension Center staff and the Center Director

as appropriate; participate in educational and service activities within and outside the University; maintain and further develop a working relationship with personnel in governmental agencies and private industry in addition to other individuals in the application of earth science research, and assume other duties and responsibilities in support of Division programs as assigned. This is a 12-month tenure-leading position. Salary and rank are commensurate with experience and qualifications. Resume, transcripts and names, addresses and telephone numbers of three references should be sent to: Search Committee, Conservation & Survey Division, University of Nebraska-Lincoln, 113 Nebraska Hall, Lincoln, Nebraska 68588-0517. Closing date for application is June 12, 1987 or until suitable applicant is found thereafter. Affirmative Action/Equal Opportunity Employer.

#### COLORADO SCHOOL OF MINES

Applications are invited for four full-time, tenure-track positions to begin August 1987. Candidates should be dedicated to teaching undergraduate (geological engineering curriculum) and graduate courses, supervising graduate student research, maintaining strong research programs, and applying science and engineering to solving problems in geologic environments. Commitment to interdisciplinary education and research, development of research funding and a strong field orientation are essential. A Ph.D. degree or equivalent experience is required; academic rank and salary are dependent on qualifications.

**Hydrogeology.** Applicants must have a theoretical understanding of and field experience with numerical ground water models in diverse geologic environments. Strength in some combination of contaminant transport, waste management, fluid dynamics of petroleum generation and migration, and mineral deposit formation and relation of fluids to rock failure would be desirable. Professional registration or certification is desirable.

**Petroleum Geology.** Applicants should possess experience in petroleum exploration, and a strong background in carbonate geology is highly desirable. Research interests are not predetermined, but some combination of carbonate geology, petroleum exploration, design and strategy, and source rock geochemistry and hydrocarbon maturation is desirable.

**Sedimentary Diagenesis.** In addition to a general knowledge of carbonate and siliciclastic rocks, applicants must be competent in inorganic and organic chemistry, numerical representation of fluid-rock interactions and diagenesis. Strength in clay mineralogy and fluid dynamics is desirable.

**Volcanology/Igneous Petrology.** Preference will be given to applicants whose backgrounds complement the mineral deposits and geotechnical engineering programs at CSM. Research interests are not predetermined, but some combination of mineralogy, volcanic-hydrothermal systems, volcanic hazard assessment and petrochemistry is desirable.

Letter of application, resume, brief statement of immediate teaching and research goals, and names of three references should be sent to: Dr. Samuel S. Adams, Head, Department of Geology and Geological Engineering, Colorado School of Mines, Golden, CO 80401. Colorado School of Mines is an equal opportunity/affirmative action employer.

## Services & Supplies

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**EARTH SCIENCE BOOKS BOUGHT AND SOLD.** Catalogs issued. James G. Leishman, Bookseller, Box A, Menlo Park, CA 94026-1201.

**WANTED:** Used, in excellent condition, Kern PG2 Stereoplotting Instrument. Contact David B. Slemmons, Center for Neotectonic Studies, University of Nevada-Reno, Reno, NV 89557.

**WANTED: JOURNAL DONATIONS.** The Earth Sciences and Resources Institute, University of South Carolina would like to expand its geological/geophysical library. We are seeking back issues of several specific journals and would appreciate your donation. Gifts are tax deductible to the extent allowable by law. For more information on specific journals and issues needed, please write or call Liza Morris, ESRI, USC, Columbia, SC 29208, (803) 777-6484.

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#### EMTEK APPLICATIONS LABORATORY

EMTEK, a worldwide parts and service organization supporting the Applied Research Laboratories line of electron microscopes, models SEMQ, EMX and AMX, is announcing the opening of an applications laboratory at its headquarters site in Valencia, California.

EMTEK's Application Laboratory has a six-spectrometer ARL SEMQ electron microscope and is staffed with professionals who have a total of 40 years' experience in geological and metallurgical applications using the electron microscope. Our facility supports all phases of research from sample preparation, analysis, and consultation all the way through to the final report.

To discuss your application, please contact Bob Folsom at:

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# PHOENIX

1987 GSA Annual Meeting

## ABSTRACTS DEADLINE: JUNE 11

Abstracts must be typed on 1987 abstract forms, available from Abstracts Secretary, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, or call (303) 447-8850. Volunteered abstracts must be mailed to the same address in time to arrive on or before June 11, 1987.

# PHOENIX

## INSIDE \_ \_ \_

Annual Meeting Survey .....	p. 97
1987 Short Courses .....	p. 103
Division and Section Officers .....	p. 106



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