

The Geochemical News

Newsletter of the Geochemical Society

Number 75

Fall 1989

Meetings and Symposia

GEOCHEMICAL SOCIETY 1989 ANNUAL FALL MEETING in conjunction with the Annual Meeting of the Geological Society of America, St Louis, Missouri, November 5-9. Preregistration deadline October 6 (form on p.12 below); hotel reservation deadline October 13 (form on p.14). For further information, see GSA News and Information Vol. 11 No. 8, August 1989, or apply to GSA Meetings Department, P.O. Box 9140, Boulder, CO 80301, Telephone 303-447-2020.

The Joint Technical Program Committee met later than usual this year; consequently the Program was not available at time of going to press. It will be included in GSA Abstracts with Programs Vol. 21 No. 6, which will be on sale (price \$18.75) in the registration area of the Cervantes Convention Center. Events of particular interest to Geochemical Society members include:

- 5 Nov. (Sunday afternoon): OGD Symposium - Molecular Approaches to Paleoclimatic and Paleoenvironmental Reconstruction. Convened by Simon C. Brassell, Stanford University;
- 7 Nov. (Tuesday afternoon): Geochemical Society Symposium - Implications for the Geological Sciences from Recent Developments in Geochemical Techniques and Instrumentation. Convened by J. Michael Rhodes, University of Massachusetts, and Alan Zindler, Lamont-Doherty Geological Observatory;
- 8 Nov. (Wednesday morning): Geochemical Society Presidential Address by Larry A. Haskin (11.15 to 12 noon); Geochemical Society Luncheon and Awards Ceremony (12.30-2 p.m.). Tickets for the luncheon (\$17 each) with preregistration (see p.12) or at the registration desk, Cervantes Convention Center, until noon on Tuesday. Wine available in the dining room for cash.

GSA SHORT COURSES at St Louis of possible interest to geochemists include:

1. Contaminant Hydrogeology: Practical Monitoring, Protection and Cleanup. Sat. Nov. 4, 8 a.m. to 5 p.m., and Sunday Nov. 5, same time, Cervantes Convention Center;
2. Creating Geological Applications with Mackintosh Hypercard. Sat. Nov. 4 and Sun. Nov. 5, 8 a.m. to 5 p.m., Cervantes Convention Center;
3. Current Aspects of Basin Analysis and Sedimentary Geology: a Two-Day Overview. Sat. and Sun. Nov. 4 and 5, Cervantes Convention Center;
4. Fission-Track Analysis: Theory and Applications. Sat. Nov. 4 and Sun. Nov. 5, 8 a.m. to 5 p.m., Sheraton Hotel;
5. Planning Hydrologic and Geologic Investigations and Reports. Sat. and Sun. Nov. 4 and 5, 8-5 p.m., Cervantes Convention Center;
8. Fabric of Cements in Paleozoic Limestones. Sat. Nov. 5, 8 a.m. - 5 p.m., Washington University;
10. Quaternary Climates: the Ocean Sedimentary Record. Sun. Nov. 5, 8 a.m. - 5 p.m., Cervantes Convention Center.

Registration deadline October 6. Registration form on p.16.

EUROPEAN UNION OF GEOSCIENCES 10TH ANNIVERSARY MEETING, Strasbourg, 24-28 March 1990. General sessions and specialized symposia. Suggestions for titles and names of possible conveners welcome up to 31 October 1989. Inquiries to Organizing Committee, EUG VI, University of Trieste, Institute of Mineralogy, Piazzale Europa 1, I-34100, Trieste, Italy.

V. M. GOLDSCHMIDT CONFERENCE, Hunt Valley, Baltimore, Maryland, 2-4 May 1990. Chemical aspects of the earth and planetary sciences. Includes symposia on Ab-Initio Methods and Molecular Dynamics, Advances in Mass Spectrometric Techniques, Advances in Spectroscopy of Minerals, Melts and Glasses, Aqueous Surface Chemistry and Kinetics, Fluids in Melts, Frontiers in Aqueous Geochemistry, High-Pressure Mineral Physics, Applications of Geochronometry and Geospeedometry to Crustal Problems, Chemical Reactions in the Crust, Geochemistry of the Environment, Isotopic Modeling, Large-Scale Crustal Flow, Fluids in Subduction Zones, Geochemical Cycles and Earth History. Deadline for unsolicited abstracts 27 November 1989. Further information and abstract forms from Donna Ricketts, 409 Keller Conference Center, The Pennsylvania State University, University Park, PA 16802.

Officers for 1990

President: J. J. Papike, South Dakota School of Mines and Technology

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Editors: *Geochimica et Cosmochimica Acta* - Gunter Faure, The Ohio State University;
The *Geochemical News*: S. B. Shirey, Carnegie Institution of Washington (DTM);
Special Publications Series: D. G. Brookins, University of New Mexico

Organic Geochemistry Division: Chairman, P. A. Meyers, University of Michigan; Secretary, S. Macko, Memorial University of Newfoundland

Awards for 1989

V. M. Goldschmidt Medal and Lester W. Strock and Family Honorarium: Karl K. Turekian, Yale University

Alfred Treibs Medal: James R. Maxwell, University of Bristol, for his work on the origin and geochemical significance of acyclic isoprenoids, origin and evolution of steroidal and triterpenoid compounds, and the geochemistry of petroporphyrins

F. W. Clarke Medal: no award this year

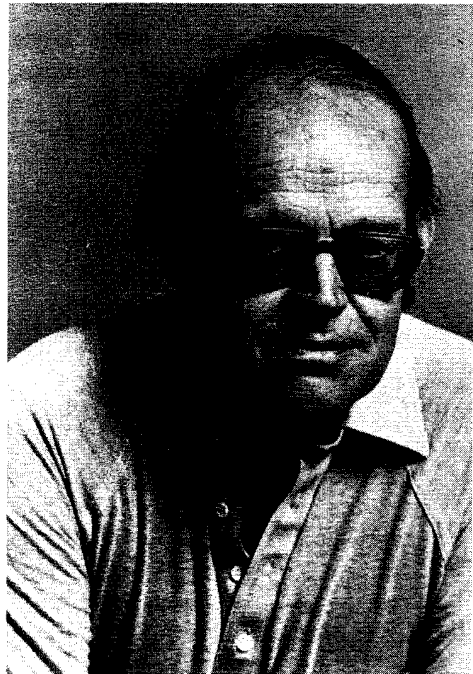
Organic Geochemistry Division Best Paper Award (for a paper published in 1988): Jaap S. Sinninghe Damste, W. Irene C. Rijpstra, Jan W. de Leeuw, and P. A. Schenck - Origin of organic sulfur compounds and sulfur-containing high-molecular-weight substances in sediments and immature crude oils. *Organic Geochemistry* 13, 593-606 (1988). The citation reads: "This paper serves as a landmark in the establishment of organic sulfur compounds as materials of great interest in organic geochemistry. Detailed aspects of the structures and distributions of these compounds are proving to carry information regarding depositional environments, correlations between crude oils

and source beds, and the kinetics of petroleum formation. Of particular importance in such interpretations are knowledge of the origins and times of formation of organic sulfur compounds. Sinninghe Damsté and coworkers have contributed very important information on these questions, showing that incorporation of sulfur in organic compounds can begin during early diagenesis and can involve many of the hydrocarbons well known as "biomarkers." Their findings strongly encourage further exploration of this subject and establish it as a field of importance and great interest."

HANS PETER EUGSTER, 1925-1987*

Hans Peter Eugster was born in Landquart, Switzerland, on November 19, 1925, the third of five children. He died suddenly of a ruptured aorta at the Johns Hopkins Hospital in Baltimore on December 17, 1987. He is survived by his wife, Elaine H. Koppelman, the James Beall Professor of mathematics and computer science at Goucher College; his three daughters by a previous marriage, Rachel, Erica and Sandra; and two brothers, Conrad and Carl, in Switzerland.

He was raised in a middle-class family where intensive learning was considered an invaluable investment for the future; playing music was its most suitable and compatible complement. Hans enjoyed bicycle tours, mountaineering, and skiing (downhill and on seal-skins). Endurance and frugality were considered important for making headway and building character.



Hans combined these inherited values with his ability to organize his time. In his later life, during a visit back to Switzerland to go mountaineering in the Bernina region with his two brothers, they were trapped by a snowstorm at the start of their climb in a hut at the Diavolezza. Hans was not desperate. Paper napkins were organized so that he could begin writing a scientific article, which had been lying on his chest for who knows how long.

Hans's interest in geology was evident at an early age. On a family outing to climb to a high Alp in the Grisons, a brisk pace was set, but young Hans repeatedly lagged behind. The rest of the family grumbled, but adjusted their pace down. However, the situation did not improve; Hans was still not able to keep up. His father, who was a methodical engineer, inquired into the deeper reasons for the delay. Hans diligently had been collecting stones on the way, and he had filled his pockets to the point where he could barely walk. The Grisons was a paradise of petrography for an eight-year-old.

Hans received a diploma in engineering geology from the Swiss Federal Institute of Technology (ETH) in 1948. During the next two summers he assiduously mapped and collected metamorphic rocks necessary for his Ph. D. thesis under Paul Niggli. While at his field H. Q. at Alp Russien, which was also the alpine dairy center for the summer season of the whole Oberland valley, he solved the "Chästeilet". The chief of the chalet was responsible for correctly allocating the total cooperative cheese output to the individual owners of the cows. He felt relieved when Hans volunteered to assist him in this involved calculation. Hans devised a consistent algorithm and did the computing with his slide rule; his results were fast, precise and reliable. When Hans gracefully ended his field season, he carried on his return, in addition to a rich harvest of rock samples meticulously catalogued, a rucksack full of delicious cheese from his grateful hosts.

*A brief obituary notice of H. P. Eugster appeared in The Geochemical News No. 74, September 1988.

During his Ph. D. program, he spent a year at the Institute for Snow and Avalanche Control near Davos as a crystallographer. He spent hours and hours inside a small laboratory at temperatures well below freezing, studying the formation of snow crystals, while outside there were plenty of them, in any condition of metamorphosis! The laboratory was at the top of a long ski run, and it may have been this attraction at the end of the day that was his reward. He was usually the last one down the hill at night. Once he fell and broke his leg, and had to use the two skis as a sled to make it to the bottom of the hill and first aid.

After he received his Ph. D. in 1951, Hans planned to spend 8 months at MIT studying optical spectroscopy with Louis Ahrens, and then return to teach at Paul Niggli's Institute. On Niggli's death, Hans chose to accept an invitation in 1952 to study the synthesis of micas at the Geophysical Laboratory under the tutelage of Hat Yoder. While Hans was synthesizing micas, Bowen and Tuttle were working on granites next door. Hans found it to be an exhilarating time, each day bringing new surprises. Here he was first exposed to the use of chemical thermodynamics through his collaboration with Dave Wones. He realized its potential power when applied to geologic problems. At the Geophysical Lab, Hans developed the oxygen buffer technique for studies of redox equilibria at high temperatures and pressures. This was, perhaps, his most significant contribution, which led to the routine consideration of oxygen and hydrogen fugacities as important intensive parameters in petrogenesis. During the ensuing years, Eugster and his coworkers extended the buffer technique to reactions involving carbon, fluorine, nitrogen and sulfur species, as well as acids, bases and metal chlorides in supercritical aqueous solutions. A whole new field concerned with measuring properties of supercritical fluids opened up when it was realized that some of the buffers could be modified to serve as sensors. All this led to a quantitative understanding of the rôle of fluids in the processes of mineral formation within the earth's crust and mantle.

In 1957, Hans was invited by Aaron Waters to teach a seminar in geochemistry and petrology at the Johns Hopkins University in Baltimore. In the following year, he left the Geophysical Lab to accept an associate professorship in experimental petrology at Johns Hopkins. With the appointment of Hans, the geology department shifted from a historical to a process-oriented approach. Bowen's lab at the University of Chicago and Hans's lab at Johns Hopkins became two of the leading centers for the teaching of experimental petrology.

In 1958, while reviewing a manuscript by Charles Milton on the minerals of the Eocene Green River Formation of Wyoming, Hans saw at once that one could go beyond cataloguing and describing the unusual minerals and could look at the mineral assemblages in terms of phase equilibria. It was a natural conclusion for someone like Hans, who was familiar with the pioneering work of Van 't Hoff on the evaporation of sea water. This sparked his interest and led to his work in hydrology and sedimentology. Beginning with the Green River Formation, through Saline Valley and Searles Lake in California, to Lake Magadi in the Rift Valley of Africa, Lake Chad in the Sahara, the salt lakes of the Bolivian Altiplano, the Qaidam Basin of China, and the Great Salt Lake in Utah, he evaluated the hydrologic, chemical and sedimentological processes leading to the formation of evaporites in continental and marine basins. In the Lake Magadi area, Kenya, Hans discovered two new minerals, magadiite ($\text{NaSi}_7\text{O}_{13}[\text{OH}]_3 \cdot 3\text{H}_2\text{O}$) and kenyaite ($\text{NaSi}_7\text{O}_{13}[\text{OH}]_3 \cdot 3\text{H}_2\text{O}$), which he considered to be precursors of the bedded cherts found in that area. He also postulated that the same inorganic mechanism for the formation of bedded chert could be applied to the Precambrian banded iron formations. When necessary, his work on chemical sediments was backed by experiment and modeling, finally leading to a computer solution of geologically consistent phase diagrams for the evaporation of seawater, the task that Van 't Hoff could not attain experimentally. Hence, the students and associates of Hans had a choice, either to be dragged in the mud pursuing the origin of chemical sediments or to become a high-pressure cook calibrating metamorphic reactions.

Hans's interest in the Green River Formation led him to Wyoming. During his yearly sojourn at the University of Wyoming, Bob Houston introduced him to Indian art, particularly rugs, and interested him in the origin of ore deposits. This was another turning point in his career, which led to experiments in the solubility of ore minerals and the formation of

hydrothermal ore deposits, From these experimental data, he speculated on the origin of the Cornwall-type magnetite deposits and the tin deposits at Dachang in SE China. In Iceland, he studied the evolution of geothermal systems in a young volcanic pile and their recharge with surface water. At the same time, he became interested in the formation of hydrothermal ore-bearing fluids from granitic melts.

Although many of the problems Hans set out to solve were fundamental, he could probably have made major contributions to industry. In one case, a Hopkins postgraduate student wanted a more practical problem to work on. Hans suggested working with General Electric, which needed substances that were perfect insulators along one axis and perfect conductors along the other. Hans thought that if micas could be synthesized with gold in the interstices, they might have the desired properties. The student left, opting for the private sector, but did not pursue the problem. Little did they know at the time that they were standing on the cutting edge of the silicon chip.

Hans was an excellent teacher. His teaching was characterized, firstly by the clarity of his highly organized lectures, many illustrated with elaborate blackboard drawings using five colors of chalk, and secondly by his homework assignments that essentially asked the students to derive some of the material for his next lecture. The problems were quite demanding and, although seldom completed, prepared one for grasping the logic and significance of the subsequent lecture. Some assignments included problems for which Hans himself had not found an answer; these were often springboards for a student's Ph. D. research. Together, Hans's clear, logical lectures and his challenging homework assignments brought his students to the frontiers of his subject while providing them with the skills and background to advance these frontiers. Perhaps inadvertently, his approach also transmitted the skill and dedication to excellence in teaching that is characteristic of so many of his former students. His students, colleagues and friends shared his good cheer and sense of humor. They also benefited from his generosity in sharing his ideas and insights and his demand for creativity.

Hans spent 31 years at Johns Hopkins. During that time, he received the Day Medal of the Geological Society of America in 1971, the Goldschmidt Medal of the Geochemical Society in 1976, and the Roebling Medal of the Mineralogical Society of America in 1983. Also, in 1981 a new mineral, eugsterite ($\text{Na}_4\text{Ca}[\text{SO}_4]_3 \cdot 2\text{H}_2\text{O}$), was named in his honor. He was president of the Mineralogical Society of America in 1985, chairman of the Department of Earth and Planetary Sciences at Johns Hopkins from 1983 to 1987, adjunct professor at the University of Wyoming from 1970, and a member of the National Academy of Sciences and the American Academy of Arts and Sciences. He worked part time for the U. S. Geological Survey from 1958 to 1976.

Hans also excelled in the fine arts. One of the things he brought with him from Switzerland was his violin. He played for many years in the Goucher Hopkins Community Orchestra. The year he received the Day Medal, he attended the meeting during the day, drove back to Baltimore to attend a rehearsal of the orchestra, and returned to Washington next day to accept the medal. Hans was also a very talented painter. He continually experimented, and in that respect may have been ahead of his time. After two exhibitions of his art, Hans expanded his interest to pottery, concentrating on murals and sculpture. He built his own kiln on his farm, the largest non-commercial kiln in Maryland. So as his interests in the sciences moved from high-temperature to low-temperature processes, his art went in the opposite direction. The glazes used in pottery are usually mixtures of natural minerals fired to a temperature where they melt and blend. The colors of some of the prettiest glazes are controlled by oxidation-reduction reactions, in which Hans was already an expert. At one point in his life, he seriously considered giving up science to devote himself totally to his painting. Perhaps it was only finding a new scientific challenge -- namely his work in Magadi -- that stopped him from doing this. He found it hard to explain his fascination with salt lakes. They were an enormous source of fun, adventure and excitement for him. Hans was a rare example of a meld between the two "cultures", the arts and the sciences.

Although Hans never had a course in physical chemistry or thermodynamics, he mastered both. Most of his research was the application of chemical thermodynamics to mineral systems. From the time that Hat Yoder introduced him to the world of hydrothermal synthesis, Hans's central theme remained the interaction of minerals with aqueous fluids, from metamorphic fluids to surface waters, igneous gases to hydrothermal brines. His excellent work in experimental petrology, chemical sediments and ore deposits made him one of the most broadly-based, as well as one of the foremost, of contemporary petrologists. With the passing of Hans Eugster, the Earth Sciences have lost an outstanding researcher and teacher who has left behind an entire generation of "chemical geologists."

Bill Gunter

ACS symposium in honor of the late R. M. Garrels

The Geochemistry Division of the American Chemical Society is holding a symposium on crustal geochemical cycles in remembrance of Bob Garrels, at the ACS Annual Meeting in Miami Beach, 10-15 September 1989. The symposium is convened by Jim Herring, USGS; among the speakers are many of Bob's colleagues, former students and friends.

Call for proposals for the 1990 Geochemical Society Annual Meeting, Dallas, October 28 through November 1

Members of the Geochemical Society are invited to submit proposals for the Geochemical Symposium at the 1990 Annual Meeting, to be held in conjunction with the Geological Society of America Annual Meeting in Dallas, Texas, October 28 - November 1. Proposals can be informal and should contain a symposium title, the name(s) of the convenor(s), a one- or two-paragraph statement outlining the topic and objectives of the symposium, and a list of potential contributors. Proposals must be submitted by December 15, 1989, and will be evaluated by the Program Committee on the basis of scientific merit, timeliness and interest to the membership of the Society. Proposals or enquiries should be sent to Dr L. Peter Gromet, Chairman of the Program Committee, at the Department of Geological Sciences, Brown University, Providence, RI 02912. Dr Gromet's telephone No. is (401) 863-1920.

Members are reminded that they can also suggest topics for Theme Sessions for inclusion in the Technical Program of the 1990 Annual GSA Meeting. Approximately one-half of the geochemistry abstracts submitted for the 1989 meeting were part of theme sessions. GSA plans to continue with the Theme Session concept in future meetings. Suggestions should be sent directly to GSA Meetings Department, P.O. Box 9140, Boulder, CO 80301 (Tel 303-447-2020).

Nominations for the V. M. Goldschmidt Award

The V. M. Goldschmidt Award Committee solicits nominations for the Award from the Society's membership. The V. M. Goldschmidt Award shall be made for major achievements in geochemistry or cosmochemistry. Such achievements may consist either of a single outstanding contribution or of a series of publications that have had great influence on the field. The Award will normally be given annually but may be reserved at the discretion of the Council. Members of the Council are ineligible for the duration of their terms; past medalists are permanently ineligible. Nomination forms can be obtained from the committee chairman (below) but are optional. Nominations should include the nominee's name, address and citizenship; state his or her chief fields of specialization; give a brief biographical sketch, and conclude with a statement about the nominee's chief contributions to geochemistry or cosmochemistry and a selected bibliography. Nominations must contain the name, address, telephone number and signature of the nominator. To be considered for an award in November 1990, nominations should be submitted by November 1, 1989 (so that they can be distributed to the committee by December 1, 1989) to the committee chairman, Dr J. Stephen Huebner, Mail Stop 959, U.S. Geological Survey, Reston, VA 22092, USA.

International News

In order to better serve the interests of North American geochemists, and in recognition of the international character of modern geochemistry, the Geochemical Society has created the position of International Secretary. The goal for this position is to increase awareness in North America of geochemistry and geochemists around the world, and to facilitate exchange between scientists of different countries.

The Goldschmidt Conference, held in Hunt Valley MD in May, 1988, was convened in part to accomplish these goals of international geochemical exchange. Some 500 geochemists attended the meeting where 300 papers, approximately one quarter contributed by scientists from outside North America, were given. In addition to open sessions, many half- and whole-day symposia were held on subjects including Modern Concepts in Crystal Chemistry, Lithosphere-Asthenosphere Interactions, Ore-Forming Processes, Trondhjemites, Geochemistry of Sulfur, Archean Environment, Paleoatmospheres and Oceans, Platinum Group Elements, Diagenesis of Humic Substances, Cosmogenic Radionuclides, Geochemical Cycles, Environmental Geochemistry, Organic Geochemistry, and Mantle Mineralogy and Petrology. A. E. Ringwood presented the Ingerson Lecture in a plenary session prior to the opening reception.

The Second Goldschmidt Conference is scheduled for May 2, 3 and 4, 1990, in Baltimore, just prior to the AGU meeting. Dr Peter Deines, The Pennsylvania State University, is general chairman for the meeting, and Dr Tony Lasaga, Yale University, will be chairman of the Technical Program Committee. The conference will again include a number of half- and whole-day symposia on a variety of topics. Further information can be found on p. 2 above.

The European Union of Geosciences (EUG) held their 5th meeting in Strasbourg, France, March 20-23, 1989. The European Association for Geochemistry (EAG) sponsored four symposia of special interest (Modelling Geochemical Transport in Deep Groundwater, Microanalytical Methods in Mineralogy and Geochemistry, Isotopes and Climatic and Environmental Change, and High-Pressure Mineralogy and Phase Transitions) in addition to open sessions and other EUG-sponsored special symposia. Dr Y. Bottinga, Institut de Physique du Globe, Paris, is being succeeded by Dr H. Wanke, Max-Planck-Institut für Chemie, Mainz, as president of EAG. (An announcement of the 1990 EUG Meeting will be found on p. 2 above.)

Dr S. Ross Taylor, the Australian National University, and Dr Albrecht Hofmann, Max-Planck-Institut für Chemie, are councilors of the Geochemical Society. The Geochemical Society sponsored a lecture tour for Ross Taylor in November and December, 1988. Ross spoke at the University of Minnesota, Washington University, the University of Houston, Rice University and the University of California, Berkeley, on "The Origin of the Moon" and "Continental Crustal Evolution in the Precambrian". Another Geochemical Society-sponsored lecture tour for Dr Taylor is planned for late October and early November, 1989, prior to the GSA meeting in St Louis, November 5-9. Dr Al Hofmann will also embark on a Geochemical Society lecture tour, speaking on "Mantle Geochemistry: Riddle of Recycled Reservoirs" and hosted by the University of Massachusetts at Amherst, Lamont-Doherty Geological Observatory, the Massachusetts Institute of Technology, Carnegie Institution of Washington, and Yale University, prior to the May 1989 AGU meeting in Baltimore.

Questions, comments, inquiries and items for inclusion in the International News section of THE GEOCHEMICAL NEWS may be submitted to Dr Julie Morris, International Secretary, Dept. of Terrestrial Magnetism, 5241 Broad Branch Road NW, Washington, DC 20015, USA

Julie Morris

Tax Relief for U. K. residents

Thanks to an initiative by Paul Henderson (British Museum of Natural History), the Inland Revenue has approved the Geochemical Society under Section 201 Income and Corporation Taxes Act, 1988, with effect from 6 April 1988. Inspectors of Taxes are being notified of the Society's approved status in September 1989; the Head Office reference is T1644/33/1988/MT. Geochemical Society members resident in the UK or otherwise subject to UK income tax are now entitled to deduct their annual dues from personal income for tax purposes.

A global geochemical data bank

The National Geophysical Data Center, Boulder, Colorado, announces a new release of the Igneous Petrological Data Base (IGBA). Version 3 of IGBA contains over 12,000 specimen descriptions from more than 1,000 sources worldwide. Information for each specimen generally includes weight-percent of essential oxides, trace elements, rock name, and latitude and longitude of the sample site. Specimen descriptions may also include stratigraphic and physical age, mineral assemblages occurring in the specimen, and petrographic descriptors concerning mode of occurrence, state of preservation, texture, structure, and type of alteration. The complete IGBA data base, including data, bibliography, reference table, and software, is available on magnetic tape or 5¼" IBM-PC compatible floppy diskette. Inquiries can be sent to the National Geophysical Data Center, NOAA, Code E/GC1, 325 Broadway, Boulder, CO 80303, USA; Telephone (303) 497-6967, Telex 592811 NOAA MASC BDR.

Request for contributions to NRC assessment of the state of solid-earth sciences in the USA

The National Research Council has established a committee under the Board of Earth Sciences and Resources to undertake a critical assessment of the state of our knowledge of the basic and applied solid-earth sciences. A report (nearing completion) will be issued which will review the current solid-earth sciences in order to assess recent advances; identify emerging lines of research promise; identify and address key scientific and societal issues; and identify and assess directions, changes and contributing factors. The report will recommend long- and short-range research priorities; research policy options; opportunities for increased effectiveness; and rôles for government, academia and industry. The Committee welcomes contributions from the scientific community. Comments and suggestions should be sent to Dr Peter J. Wyllie, Committee on the Solid-Earth Sciences, National Research Council (HA 460), 2101 Constitution Avenue NW, Washington, DC 20418.

THE GEOCHEMICAL NEWS moves to Washington

When this newsletter was resurrected in 1980 with No. 57, we wrote that those who remembered the dignified and corpulent GEOCHEMICAL NEWS that fell asleep in 1973 might shudder at the mean and skinny animal that had awakened. "Ab equis ad asinos," they would mutter, like centurions of the decaying Roman legions. For the past nine years THE NEWS has made its home at Wright State University, whose generous subventions have put a little flesh on its bones, even if they couldn't change the burro back into a horse. Now it has to leave the bucolic peace of southwest Ohio for the metropolitan swirl of Washington: a prospect that's been known to daunt young congressmen, let alone asses. But there's comfort in the address. "Broad Branch Road" has about it the alliterative burr of country speech, and the name itself would fit some winding byway along the Little Miami River. There are more geochemists on Broad Branch Road than in the whole of Dayton, and there's probably a laser-jet printer into the bargain. Steve Shirey will make THE NEWS fatter and sleeker, and perhaps even return it to its former glory. Good luck, Steve!

Items for inclusion in THE GEOCHEMICAL NEWS should henceforth be sent to:

Dr S. B. Shirey,
Department of Terrestrial Magnetism,
Carnegie Institution of Washington,
5241 Broad Branch Road, NW,
Washington, DC 20015.



TRANSPORTATION

AIR

We suggest you visit your travel agent early to get the best reservation and airfare you can. GSA has designated the Cain Travel Group of Boulder, Colorado, as the official airline reservation agent for the 1989 GSA Annual Meeting. Meeting participants are encouraged to call Cain's toll-free number to take advantage of discounted fares on selected airlines.

Trans World Airlines (TWA) has been named the official carrier; United and Delta Airlines are additional carriers. Reduced rates are 5% off any available discount fare. These fares generally have some restrictions. The discount offered from normal coach fares will be 40% to 45%, with no minimum stay or advance purchase requirements.

To make a reservation:

- Call 1-800-346-4747 (toll-free outside Colorado) or (303) 443-2246 (collect from Canada or Colorado).
- Hours: Monday through Friday 8 a.m. to 5:30 p.m., MDT.
- Call early for best availability and identify yourself as a GSA traveler.
- Be aware of restrictions applying to discount tickets.
- Tickets can be paid for by check (payable to Cain Travel), by major credit card, or invoiced to your company. Final payment must reach Cain Travel no later than ten days prior to departure to allow for mailing time.
- All tickets will be mailed via certified mail upon receipt of payment unless requested otherwise.
- After tickets are issued, you are protected from fare increases; if a fare decreases, call Cain Travel for an adjustment.
- Cain Travel will have an on-site Customer Service Desk at the Cervantes Convention Center in St. Louis.

GROUND

The Lambert St. Louis International Airport is 12 miles from the Cervantes Convention Center and the downtown area (approximately a 20-minute ride). Transportation options are as follows.

Airport Limousine Service

Airport to hotel. Open from 5:30 a.m. to 10:00 p.m., 7 days a week. To purchase a ticket, go to the booth opposite Exit 13 in the baggage claim area. Departures are every 20 minutes. Cost: \$6.

Hotel to airport. The Airport Limousine Service stops at all major downtown hotels every 20 minutes. For additional information or advance reservations call (314) 385-7400. Cost: \$6.

Taxi Cabs

Only certain taxi companies are permitted to have taxi stands at the airport. Therefore, you may experience a waiting line for service. All vehicles are metered. Charges range from \$1.00 to \$2.35 for the first mile and from \$0.50 to \$0.90 for each additional mile. Our advice: share a cab.

Bi-State Transit

Take the #4 Natural Bridge bus from the airport to downtown. Bi-State Transit buses service the St. Louis metropolitan area from 5:30 a.m. to 11:00 p.m. weekdays, and from 5:30 a.m. to 9:00 p.m. weekends. The Bi-State "Levee Line" is a free bus ride between Union Station and the Mississippi Riverfront. Look for the specially painted Levee Line buses. For general information, call Bi-State at 231-2345.

GSA Shuttle

GSA will operate a free shuttle service throughout the meeting. GSA hotel guests will be transported to and from the Cervantes Convention Center during meeting hours. The shuttle will also operate during special events at the Cervantes Convention Center and hotels.

This service will be provided each day (Sunday through Thursday) beginning at 6:30 a.m. and continuing at frequent intervals through the meeting hours. The service will continue into the evening for the special events. Look for shuttle schedules posted in GSA hotel lobbies and in registration packets. Each bus will be identified by a "Shuttle Bus" sign in the front window.

Car Rental

Budget is the official car rental agency for the meeting. Identify yourself as a GSA delegate and get guaranteed, discounted, daily/weekly rates as follows: economy/compact \$31/\$155; intermediate \$33/\$165; full size \$35/\$175; luxury \$49/\$195; mini (15-passenger) van \$70/\$325. Four-door models may be requested in the full-size and luxury class cars at no additional cost. Unlimited mileage. Vehicles may be dropped at the Lambert St. Louis International Airport, downtown (near the Adam's Mark), or in Chesterfield with no drop charges. Advance reservations are recommended. Call Budget at (800) 772-3773.

REGISTRATION

(REGISTRATION FORM ON p. 12)

PREREGISTER TODAY!

PREREGISTRATION MUST BE RECEIVED NO LATER THAN OCTOBER 6.

1. Member Discount! GSA professional members and members of GSA's Associated Societies pay \$40 less for preregistration than nonmembers. GSA student members may register for \$20 less.
2. Save! There is an additional 18% savings in registration fees if you register before the preregistration deadline! Advance registration is suggested for many of the special activities because of participation limits. Use the preregistration form provided in this announcement.
3. Registration is necessary for technical sessions and the exhibit hall. Badges must be worn for activities from 10:00 a.m. Sunday through 5:00 p.m. Thursday.
4. Registration discounts are given to GSA or Associated Society members. Associated Societies that qualify for this discount are indicated on p. 211 and on the registration form. Please indicate your affiliation(s) and member number and register using the member rates.
5. Full payment MUST accompany registration. Unpaid purchase orders are NOT accepted as valid registration. Charge cards are accepted as indicated on the preregistration form. If using a charge card, please recheck the card number given so that errors will not delay your registration.
6. Register one professional or student per form. Copy the form for your records. On the registration form, one-day registrants MUST select the day they plan to attend.
7. Guest registration is required to participate in guest activities, to attend technical sessions, or to visit the exhibit hall. Guest registrations MUST be accompanied by either a professional or student registration.
8. CURRENT student ID is required to obtain special student rates at both the on-site and preregistration counters. Students not carrying a current student ID when they arrive to pick up registration materials will be required to pay the professional fee.

CANCELLATIONS AND REFUNDS

GSA will refund advance registration fees for cancellations received in writing by OCTOBER 13.

NO REFUNDS WILL BE MADE ON CANCELLATION NOTICES RECEIVED AFTER THIS DATE. Refunds will be mailed from GSA after the meeting; there is a \$10 processing fee. Refunds for fees paid by credit card will be credited according to the card number on the preregistration form. NO refunds for on-site registration and ticket sales.

REGISTRATION FEES

	Advance (by Oct. 6)	On-Site	One-Day
Professional—Member	\$110	\$130	\$65
Professional—Nonmember	\$150	\$170	\$85
Student—Member	\$ 45	\$ 55	\$28
Student—Nonmember	\$ 65	\$ 75	\$38
Guest	\$ 45	\$ 55	N/A

ON-SITE REGISTRATION SCHEDULE

Cervantes Convention Center, Hall B

Sunday, November 5	10:00 a.m. to 7:00 p.m.
Monday, November 6	7:30 a.m. to 5:00 p.m.
Tuesday, November 7	7:30 a.m. to 5:00 p.m.
Wednesday, November 8	7:30 a.m. to 2:00 p.m.
Thursday, November 9	7:30 a.m. to 12:00 p.m.

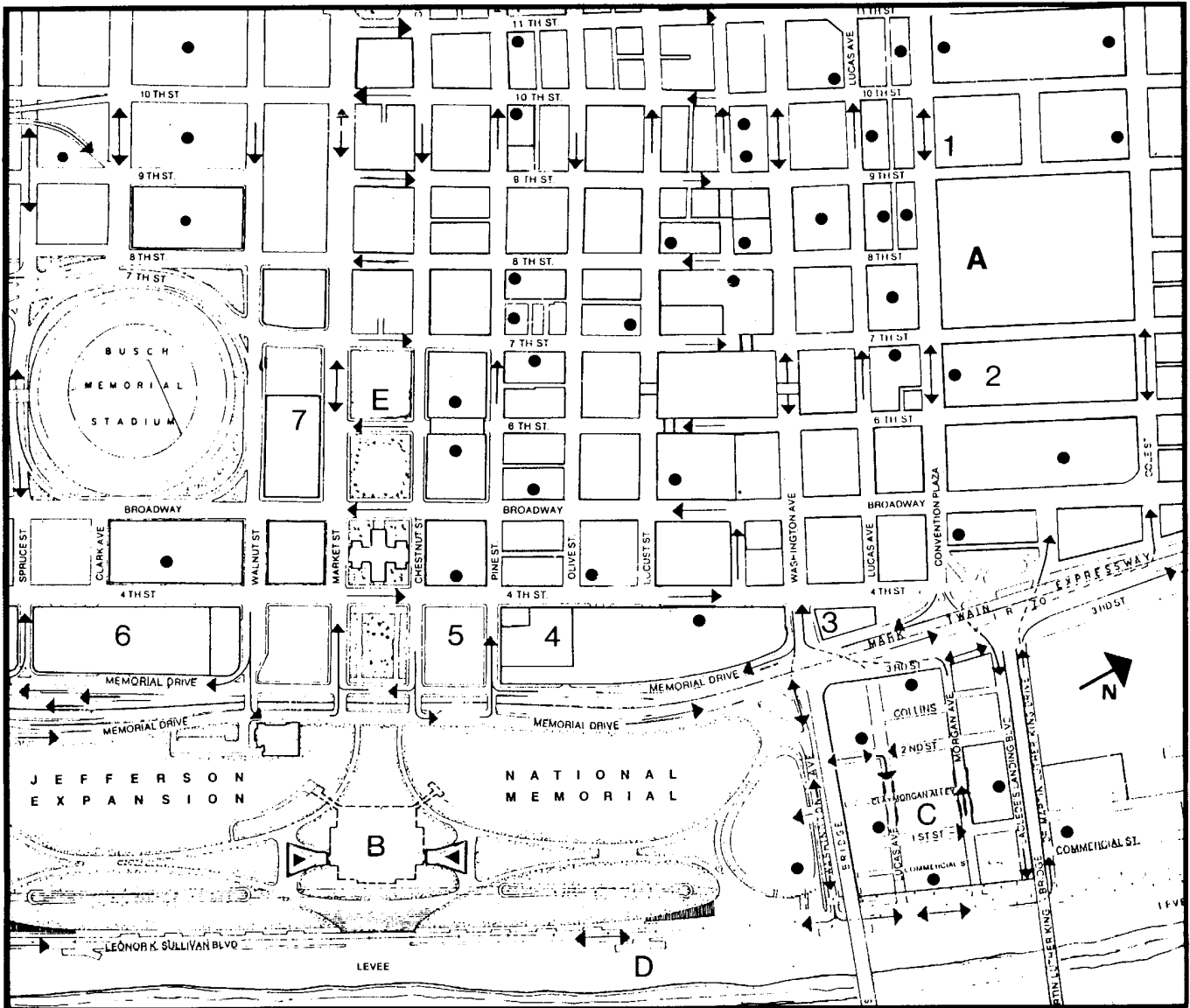
AN EXCITING NEW REASON TO JOIN GSA!

GSA recently announced a reduction in membership dues, making this the best time ever to join the Society. Now, dues of \$40 to become a new member equal the \$40 you save by attending the 1989 Annual Meeting as a member. It's like joining GSA for free! Even professional registrants who pay the nonmember registration fee and apply for membership by March 31, 1990, can take advantage of this opportunity. Simply attach a copy of your meeting registration form to your membership application and submit it to GSA headquarters.

Likewise, students who pay the new membership dues of \$20 to become a Student Associate will receive a \$20 discount on their Annual Meeting registration. Again, it's like becoming a new GSA Student Associate for free!

The \$40 registration discount for members mentioned above applies to professional members of GSA or an Associated Society. The Associated Societies that qualify are listed on the registration form. Membership applications are available prior to the meeting from GSA headquarters. During the meeting, they can be picked up at the Membership Booth in the Registration Area of the Cervantes Convention Center, Hall B.

DOWNTOWN ST. LOUIS



HOTELS

1. HOLIDAY INN CONVENTION CENTRE
2. SHERATON ST. LOUIS HOTEL
3. DAYS INN AT THE ARCH
4. HOLIDAY INN DOWNTOWN/RIVERFRONT
5. ADAM'S MARK ST. LOUIS
6. CLARION HOTEL—ST. LOUIS
7. MARRIOTT PAVILION DOWNTOWN

NON-HOTEL LOCATIONS

- A. CERVANTES CONVENTION CENTER
- B. GATEWAY ARCH MUSEUM
- C. LACLEDE'S LANDING
- D. PRESIDENT RIVERBOAT DOCK
- E. ST. LOUIS VISITORS CENTER

Dots indicate public parking lots. Rates range from \$1 minimum charge per ½ hour to \$8.50 maximum charge for all day. Some lots are open 24 hours per day, allowing overnight parking. Most lots, however, are unattended after 10:00 p.m.



PREREGISTRATION FORM

1989 GSA Annual Meeting • November 6-9

Preregistration must be RECEIVED by October 6. Payment and form MUST accompany each preregistration request. Unpaid purchase orders are NOT accepted as valid registration. One form per registrant. Cancellation deadline: October 13. No refunds will be given on cancellations received after this date. Shaded areas are badge information.

Please print ** Copy for your records

Name (Last) _____ (First) _____
 Institution/Employer _____ Nickname for badge _____
 Mailing Address _____
 City _____ State _____ ZIP code _____
 Country _____ Business phone _____ Home phone _____
 Guest/Spouse Name (Last) _____ (First) _____
 City _____ State/Country _____

Circle Member Affiliations: (1) GSA (Member # _____) (2) CF (3) GS (4) GIS
 (5) MSA (6) MAGT (7) PS (8) SEG (9) AWG (10) SGE (11) AGID (12) SVP (13) NESTA

(registration required for participation in all events)

FEES	Price	Qty	Amount
Professional Member (member of affiliation checked above)	(1) \$110	1	\$
Member One-Day (circle day: S M T W T)	(2) \$65	1	\$
Professional Nonmember	(3) \$150	1	\$
Nonmember One-Day (circle day: S M T W T)	(4) \$85	1	\$
Student Member (member of affiliation checked above)	(5) \$45	1	\$
Member One-Day (circle day: S M T W T)	(6) \$28	1	\$
Student Nonmember	(7) \$65	1	\$
Nonmember One-Day (circle day: S M T W T)	(8) \$38	1	\$
Guest (fill in name above for badge)	(9) \$45	1	\$
Day in the Park	Nov. 6		\$
Cave Tour	Nov. 7		\$
St. Louis Grandeur	Nov. 7		\$
A Visit to St. Charles	Nov. 8		\$
Historic St. Louis Walking Tour	Nov. 8		\$
Total Column A			\$

Remit in U.S. funds, payable to 1989 GSA Annual Meeting, or charge:

American Express Diners Club/ Carte Blanche MasterCard VISA

Card expires: _____ mo. / _____ yr. _____ card number
 Signature _____

(PREREGISTRATION MUST BE RECEIVED BY OCTOBER 6!)

SPECIAL EVENTS*	Price	Qty	Column B Amount
St. Louis Blues Hockey Game	(16) \$15	1	\$
5K Run (check T-shirt size: S_M_L_XL)	(17) \$12	1	\$
10K Run (check T-shirt size: S_M_L_XL)	(18) \$12	1	\$
Blues Cruise	(19) \$11	1	\$

(luncheons unless noted)

TICKETED MEAL FUNCTIONS*	Price	Qty	Column B Amount
Engineering Geology	(20) \$17	1	\$
History of Geology Division	(21) \$17	1	\$
Geophysics Division	(22) \$17	1	\$
Geoscience Information Society	(23) \$17	1	\$
Hydrogeology Division	(24) \$17	1	\$
Mineralogical Society	(25) \$17	1	\$
National Assoc. Geology Teachers	(26) \$17	1	\$
Paleontological Society	(27) \$17	1	\$
Sedimentary Geology Breakfast	(28) \$11	1	\$
Women Geoscientists Breakfast	(29) \$11	1	\$
Coal Geology Division	(30) \$17	1	\$
Geochemical Society	(31) \$17	1	\$
Quaternary Geology & Geomorphology	(32) \$17	1	\$
Society of Economic Geologists	(33) \$17	1	\$

FIELD TRIPS*	Price	Qty	Column B Amount
1 Archaeological Geology, Central Mississippi	(34) \$60	1	\$
2 Pennsylvanian and Permian, Kansas & Nebr.	(35) \$210	1	\$
3 Coal Geology Appalachian Basin/Illinois Basin	(36) \$208	1	\$
4 Geology & Hydrogeology, Nuclear Waste w/ Air	(37) \$398	1	\$
4a Geology & Hydrogeology, Nuclear Waste w/o Air	(38) \$170	1	\$
5 Regional Stratigraphy, Facies & Depositional	(39) \$110	1	\$
6 Surface Effects 1811-1812 New Madrid Earthquake	(40) \$160	1	\$
7 Hydrogeology, Shallow Karst Groundwater System	(41) \$120	1	\$
8 Olympic Dam-Type Deposits St. Francois Mtns.	(42) \$225	1	\$
9 Earthquakes & St. Louis Univ. Seismic Network	(43) n/c	1	\$
10 Geologic Story, St. Louis Riverfront	(44) \$5	5	\$
11 Engineering Geology/Industrial Minerals	(45) \$35	1	\$
12 Washington Univ. Planetary Image Facility	(46) \$10	1	\$
13 Defense Mapping Agency's Aerospace Center	(47) \$10	1	\$
14 Engineering/Environmental Geology, St. Louis	(48) \$50	1	\$
15 Transition Sedimentation, Arkoma Basin w/ Air	(49) \$320	1	\$
15a Transition Sedimentation, Arkoma Basin w/o Air	(50) \$225	1	\$
16 Quaternary Loess/Glacial Record, SW Illinois	(51) \$50	1	\$
17 Cyclic Strata, Late Pennsylvanian Outlier	(52) \$88	1	\$
18 Selected Economic Mineral Deposits w/ Air	(53) \$183	1	\$
18a Selected Economic Mineral Deposits w/o Air	(54) \$125	1	\$
19 Mississippi Valley-Type Mineralization	(55) \$150	1	\$

Check here if already registered for a short course.

GSA SHORT COURSES*	Price	Qty	Column B Amount
1 Contaminant Hydrogeology	(65) \$185	1	\$
2 Geological Applications, Macintosh HyperCard	(66) \$140	1	\$
3 Basin Analysis and Sedimentary Geology	(67) \$140	1	\$
4 Fission-Track Analysis: Theory & Application	(68) \$140	1	\$
5 Hazardous-Waste Site Characterization	(69) \$155	1	\$
6 Hydrologic & Geologic Investigations/Reports	(70) \$155	1	\$
7 Quantitative Interpretation, Joints and Faults	(71) \$140	1	\$
8 Fabric of Cements in Paleozoic Limestones	(72) \$155	1	\$
9 Glaciotectonic Structures and Landforms	(73) \$80	1	\$
10 Quaternary Climates: Ocean Sedimentary Record	(74) \$95	1	\$
Total Column B			\$
Total Column A			\$

*Meeting registration not required

Column A + B = Total Remittance (full payment must be enclosed)

FOR OFFICE USE ONLY

Deposit Date _____ Comment _____
 Balance Due \$ _____ A/R _____
 Refund \$ _____ A/P _____
 Refund Ck # _____
 Refund Date _____

Mail to: 1989 GSA Annual Meeting, P.O. Box 9140, Boulder, CO 80301

HOUSING

(RESERVATION FORM ON p. 14)

GSA has blocked rooms at seven hotels that are offering special convention rates to GSA meeting attendees. GSA endorses these hotels for quality, cleanliness, and service. All hotels have sprinkler systems except the Days Inn, which relies on smoke detectors.

RESERVATIONS

Fill out the attached Official Housing Request Form and mail it to the address shown on the form. Your Housing Request Form must be RECEIVED BY FRIDAY, OCTOBER 13. Reservations will not be accepted unless they are on the GSA form.

AFTER FRIDAY, OCTOBER 13, you are responsible for making your own reservation directly with the hotel. Note that (1) many hotels will be filled at this time, and (2) hotels will be able to offer the special GSA rate on an as-available basis.

ASSIGNMENT

Hotel rooms will be assigned on a first-come, first-served basis as they are received by the Housing Bureau. Once your request is received, the Bureau will send an acknowledgment to both you and your assigned hotel.

You will then receive a confirmation from the hotel. This is a notice that the hotel received the information from the Bureau and that the reservation has been entered into their system.

DEPOSITS/GUARANTEES

All GSA hotels suggest a first night's room deposit. Deposits can be made by (1) including a credit card number and expiration date on the housing form, or (2) sending payment directly to the hotel once you have received your confirmation from the hotel. The deposit amount should be the cost of one night's stay at your assigned hotel. Note that the Housing Bureau will ONLY accept credit card numbers, not checks or cash. When making payment directly to the hotel, be sure to give them your confirmed reservation number.

Once the hotel receives your deposit, it automatically guarantees your reservation. The guarantee assures you that no matter what time you arrive on your scheduled arrival day, your room will be held until 6:00 a.m. the following day. If you have not guaranteed your reservation, most St. Louis hotels will not hold your room beyond 4:00 p.m. of the scheduled arrival day.

CHANGES AND CANCELLATIONS

BEFORE OCTOBER 13, all changes and cancellations to your room reservation should be sent, in writing, to the Housing Bureau.

AFTER OCTOBER 13, all changes and

cancellations to your room reservation must be telephoned in to your hotel. Your notice of cancellation must be received AT LEAST 48 HOURS in advance of your scheduled arrival to receive a full refund on your first night's room deposit. Please show courtesy as a professional geologist to notify the hotel if your plans change.

Supply your hotel reservation number at the time of any change or cancellation.

NOTE: All rooms are subject to 9.85% tax and a \$1.50 per night fee.

CONVENIENCES

INFORMATION/MESSAGES

Friday, November 3 to Thursday, November 9.

Cervantes Information (314) 342-5900
Messages (314) 342-5901
Adam's Mark (314) 241-7400

CHILD CARE

GSA will offer a cooperative child-care service. UNTIL OCTOBER 11, the GSA Meetings Coordinator will accept names, addresses, and phone numbers of interested participants. You may also include information on your children and where you will be staying. ON OCTOBER 16, the information will be shared with everyone who has responded. Participants are responsible for contacting one another. You may also call your hotel for local child-care services.

NEWS ROOM

*Sunday, November 5 to Thursday, November 9,
Cervantes Convention Center.*

The News Room provides information on many topics for release to the news media. Please come in to let us know of material that is noteworthy for the science or general press. Also, members of the press may receive complimentary registration with appropriate press credentials. In advance of the meeting, contact Sandra Rush, (303) 443-8489, or the Communications Coordinator, GSA headquarters.

MISSOURI TRAVEL

Fall in the Ozarks is beautiful. Interested in a pre- or postmeeting get-away?

Missouri Division of Tourism, P.O. Box 1055,
Jefferson City, MO 65102, 1-314-751-4133

St. Louis Convention & Visitors Commission,
10 S. Broadway, Suite 300, St. Louis, MO 63102,
1-800-247-9791

GSA OFFICIAL HOUSING REQUEST FORM

Your Housing Request Form must be received BY OCTOBER 13. Please complete and send to:

St. Louis Convention & Visitors Commission/GSA Housing
10 South Broadway, Suite 300
St. Louis, MO 63102
(314) 421-1023

(Please print or type all information below and keep a copy.)

HOTEL PREFERENCE:

1. _____
2. _____
3. _____
4. _____

Rate requested \$ _____

TYPE OF ACCOMMODATION NEEDED:

- | | | |
|-----------------------------------|----------------------------|-----------------------|
| _____ Single (1 bed, 1 person) | _____ Triple | _____ 1 Bedroom Suite |
| _____ Double (1 bed, 2 persons) | _____ Quad | _____ 2 Bedroom Suite |
| _____ Dbl/Dbl (2 beds, 2 persons) | _____ Add rollaway to room | |

NOTE: All rooms are subject to 9.85% tax and a \$1.50 fee per night.

ARRIVAL DAY/DATE _____ TIME _____ a.m./p.m.

DEPARTURE DAY/DATE _____ TIME _____ a.m./p.m.

NAMES OF OCCUPANTS:

1. _____ 3. _____
2. _____ 4. _____

GUARANTEED ROOM RESERVATION AUTHORIZATION:

I understand that my reservation may not be held after the hotel guarantee time. I also understand that the hotel may bill me for one night's housing if I fail to properly cancel a guaranteed reservation. Please check one:

- _____ Credit card information provided below to guarantee my reservation.
- _____ My guarantee will be made directly to the hotel *after* I have received my hotel confirmation.
- _____ I will take my chances. No guarantee deposit will be provided.

Please guarantee my room reservation with the following:

_____ American Express _____ Carte Blanche _____ Diners Club _____ Discover _____ MasterCard _____ VISA

NAME (as listed on credit card) _____

SIGNATURE _____

CARD NUMBER _____ EXP. DATE _____

DO NOT SEND CASH OR CHECKS WITH THIS FORM

MAIL CONFIRMATION TO:

Name _____ Telephone () _____

Address _____ City _____

State _____ ZIP _____ Country _____

Please make your reservation with the Housing Bureau. Note: All rooms are subject to 9.85% tax and a \$1.50 per night fee.

1 HOLIDAY INN CONVENTION CENTRE

Ninth Street & Convention Plaza Boulevard, St. Louis,
MO 63101

(314) 421-4000 (150-room block)

1 block from the Cervantes Convention Center

Single: \$55 Double: \$65

297-room property with a five-story atrium and an indoor pool, jacuzzi, and exercise room. Two restaurants. Located next door to the Cervantes Convention Center and walking distance to most downtown attractions. Free overnight parking for registered hotel guests. Unguaranteed reservations held until 6 p.m.

Check-in: 3 p.m. Check-out: 12 noon

CC: AX, CB, D, DC, MC, V

2 SHERATON ST. LOUIS HOTEL

910 North Seventh Street, St. Louis, MO 63101

(314) 231-5100 (550-room block)

1 block from the Cervantes Convention Center

Single: \$77 Double: \$89

Children under 17 accompanied by parent are free. Two restaurants, cocktail lounge, 24-hour room service, valet laundry. \$7 per day parking and Avis Rent-A-Car office on the property. Complimentary health facility. Unheated outdoor pool. Newspaper and gift shop. Unguaranteed reservations held until 4 p.m.

Check-in: 3 p.m. Check-out: 1 p.m.

CC: AX, CB, D, DC, ER, MC, V

3 DAYS INN AT THE ARCH

333 Washington Avenue, St. Louis, MO 63102

(314) 621-7900 (125-room block)

4 blocks from the Cervantes Convention Center

Single: \$42 Double: \$42

Children under 18 accompanied by parent are free. Two blocks from St. Louis Center shopping mall. Full-service restaurant and lounge. Indoor pool, sauna, and recreation area. Coin-operated guest laundry. Attached covered parking at \$4.50 per day. Unguaranteed reservations held until 4 p.m.

Check-in: 2 p.m. Check-out: 12 noon

CC: AX, D, DC, MC, V

4 HOLIDAY INN DOWNTOWN/RIVERFRONT

200 North Fourth Street, St. Louis, MO 63102

(314) 621-8200 (300-room block)

6 blocks from the Cervantes Convention Center

Single: \$59 Double: \$68

Children under 18 accompanied by parent are free. Full-service 29-story hotel. Two restaurants, lounge, valet service, and laundry. Free indoor self-parking. Access to health club. Located directly across from the Gateway Arch and riverfront. Within walking distance to St. Louis Centre, Laclede's Landing, shopping, and restaurants. Unguaranteed reservations held until 6 p.m.

Check-in: 2 p.m. Check-out: 12 noon

CC: AX, CB, D, DC, MC, V

5 ADAM'S MARK ST. LOUIS—HEADQUARTERS

Fourth and Chestnut, St. Louis, MO 63102

(314) 241-7400 (750-room block)

7 blocks from the Cervantes Convention Center

Single: \$81 Double: \$91

St. Louis's finest and newest, European flavor and comfort. Full-service hotel with four cocktail lounges and three restaurants for casual to elegant dining. Complete fitness center with indoor swimming pool, whirlpool, saunas, racquetball courts, and exercise equipment. Self-parking \$8 per day and valet parking upon request. Concierge, laundry, and valet service, gift shop, pay movie channels. Located next to the Gateway Arch, providing a wonderful view from many rooms. Unguaranteed reservations held until 6 p.m.

Check-in: 3 p.m. Check-out: 12 noon

CC: AX, CB, D, DC, MC, V

6 CLARION HOTEL—ST. LOUIS

200 South Fourth Street, St. Louis, MO 63102

(314) 241-9500 (200-room block)

9 blocks from the Cervantes Convention Center

Single: \$57 Double: \$65

Children under 18 accompanied by parent are free. Full-service hotel with complimentary fitness center, including indoor swimming pool, whirlpool, saunas, and exercise equipment. The revolving Top of the Riverfront Restaurant, on the 29th floor, is one of two restaurants. Laundry and valet service. Attached garage parking at \$8 per day. Unguaranteed reservations held until 6 p.m.

Check-in: 2 p.m. Check-out: 12 noon

CC: AX, CB, D, DC, MC, V

7 MARRIOTT PAVILION DOWNTOWN

One Broadway, St. Louis, MO 63102

(314) 421-1776 (200-room block)

8 blocks from the Cervantes Convention Center

Single: \$75 Double: \$85

Located downtown, two blocks from the Gateway Arch. Two restaurants offer casual and fancy dining, and one lounge.

Full health club offering heated indoor pool, exercise equipment, saunas, and whirlpool. Concierge, laundry, and valet service. Self-parking is \$8 per day. Gift shops. Unguaranteed reservations are held until 6 p.m.

Check-in: 4 p.m. Check-out: 12 noon

CC: AX, CB, D, DC, MC, V

Credit card (CC) codes: AX = American Express / CB = Carte Blanche / D = Discover / DC = Diners Club / ER = Enroute / MC = MasterCard / V = VISA



Wright State University
 Department of Geological Sciences
 Dayton, Ohio 45435

1989 GSA SHORT COURSE REGISTRATION

Preregistration due by October 6, 1989. One registrant per form. Please duplicate form for each additional registrant. Payment and form MUST accompany all preregistration requests. Unpaid purchase orders NOT accepted as valid registration.

Name _____
 Nickname (for badge) _____
 Institution/Employer _____
 Address _____
 City _____ State _____ Zip _____
 Phone: Office _____ Home _____

Contaminant Hydrogeology:	
Practical Monitoring, Protection, and Cleanup	Nov. 4-5 (65) \$185 \$
Creating Geological Applications with Macintosh HyperCard	Nov. 4-5 (66) \$140 \$
Current Aspects of Basin Analysis and Sedimentary Geology:	
A Two-Day Overview	Nov. 4-5 (67) \$140 \$
Fission-Track Analysis: Theory and Applications	Nov. 4-5 (68) \$140 \$
Geological Considerations in Hazardous-Waste Site Characterization	Nov. 4-5 (69) \$155 \$
Planning Hydrologic and Geologic Investigations and Reports	Nov. 4-5 (70) \$155 \$
Quantitative Interpretation of Joints and Faults	Nov. 4-5 (71) \$140 \$
Fabric of Cements in Paleozoic Limestones	Nov. 5 (72) \$155 \$
Glaciotectonic Structures and Landforms	Nov. 5 (73) \$ 80 \$
Quaternary Climates: The Ocean Sedimentary Record	Nov. 5 (74) \$ 95 \$
TOTAL ENCLOSED \$	

Make check payable to 1989 GSA ANNUAL MEETING or charge
 _____ American Express _____ Choice _____ Diners Club/Carte Blanche _____ MasterCard _____ VISA

Card expires: ____/____/____ mo. yr. _____ card number _____
 Signature _____

HAVE YOU MADE A COPY FOR YOUR RECORDS?

MAIL TO: Edna Collis
 GSA Course Registrar, GSA Headquarters
 P.O. Box 9140, Boulder, CO 80301
 (303) 447-2020

CANCELLATION. Fees will be refunded if we are notified by October 13. Registration substitutions may be made at any time.

ANNUAL MEETING REGISTRATION AND HOUSING INFORMATION. Members will receive the registration and housing forms in the regular August issue of GSA News & Information. Nonmembers are welcome to receive the same information by calling or writing Edna Collis, GSA headquarters.

FOR OFFICE USE ONLY

Deposit Date _____ Comment _____
 Balance Due \$ _____ A/R _____
 Refund \$ _____ A/P _____
 Refund Ck# _____
 Refund Date _____