

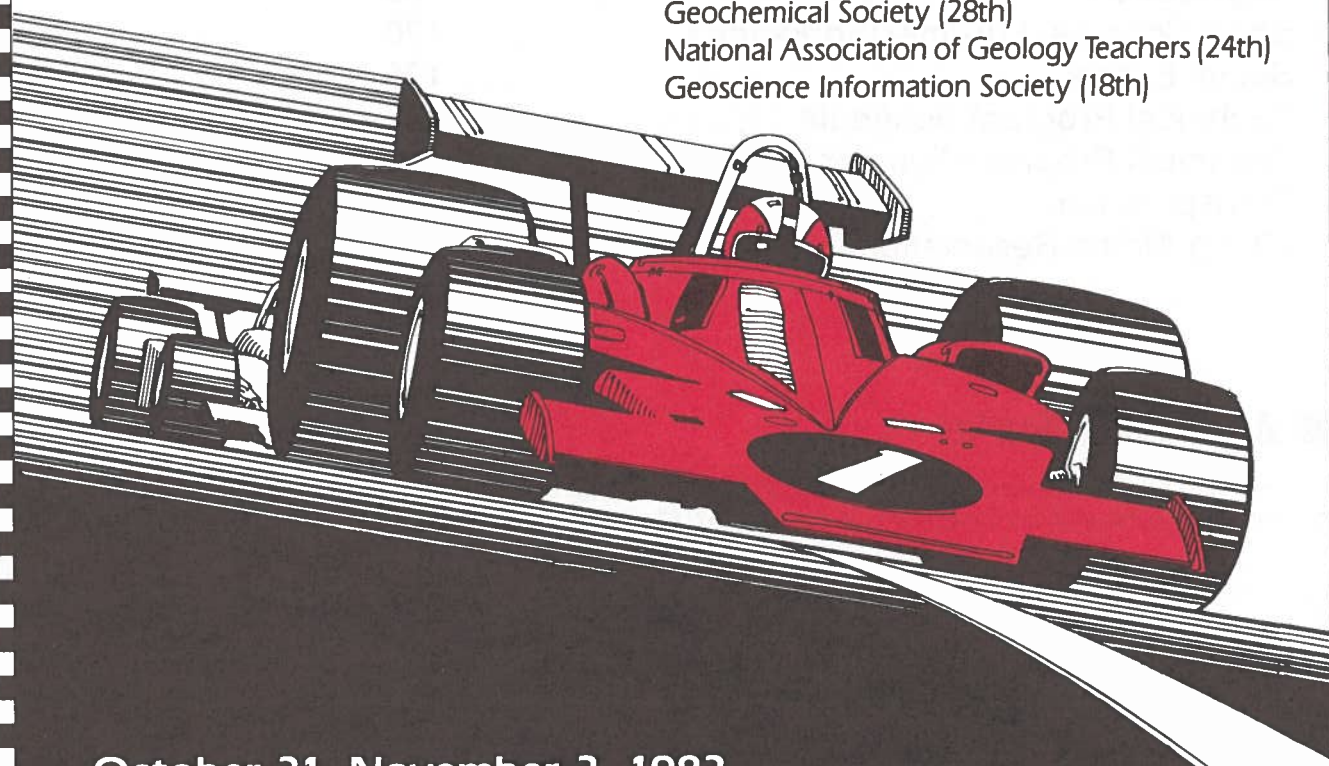
News & Information

G.S.A. ARCHIVES

THE GEOLOGICAL SOCIETY OF AMERICA

96TH ANNUAL MEETING

The Paleontological Society (75th)
The Mineralogical Society of America (64th)
The Society of Economic Geologists (63rd)
Cushman Foundation (34th)
Geochemical Society (28th)
National Association of Geology Teachers (24th)
Geoscience Information Society (18th)



October 31–November 3, 1983
Indiana Convention Center

INDIANAPOLIS



1983 GSA ANNUAL MEETING



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Jot Down These Numbers . . .

For information prior to the Annual Meeting, call the GSA Meetings Department at (303) 447-2020.
For information in Indianapolis during the meeting, call (317) 634-1240.

VOLUME 5, NUMBER 8

GSA NEWS & INFORMATION

AUGUST 1983

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Prepared from contributions from the staff and membership by F. Michael Wahl, Executive Director; Managing Editor: Faith Rogers; Associate Editor: Lee Gladish; Production and Advertising Manager: James R. Clark; Production Assistants: Ann H. Fogel and June E. Thomas.





Technical Program: Symposia



The technical program consists of volunteered sessions, symposia, and poster presentations. The

symposia schedule appears below and the entire schedule on page 132.

SUNDAY, OCTOBER 30 8:00 a.m.–12 noon

(#23) **10th Annual Symposium on Geochemical Cycles:** National Science Foundation and Geochemical Society; Bryan Gregor

1:00–5:00 p.m.

(#20) **Evolutionary and Environmental Significance of Skeletal Growth Patterns:** Gary D. Rosenberg and Richard A. Lutz

(#21) **Stable Isotope Studies of Clastic Rocks:** Nelson R. Shaffer, Gunter Faure, and I. R. Kaplan

(#23) continued

MONDAY, OCTOBER 31 8:00–11:30 a.m.

(#2) **Paleoclimatic Controls on Coal Resources of the Pennsylvanian System of North America:** Coal Geology Division; C. Blaine Cecil and Tommy L. Phillips

(#6) **1983 Centennial Symposium: Hydrodynamics and Geochemistry of Ore Generation in Sedimentary Environments:** Hydrogeology Division and Society of Economic Geologists; William C. Kelly and John M. Sharp

(#10) **Miocene Paleooceanography:** Cushman Foundation; G. P. Lohmann and Samuel M. Savin

2:00–6:00 p.m.

(#5) **Some Significant Geologic Ideas Originating from the Study of Cratons:** History of Geology Division; Ursula B. Marvin

(#6) continued

(#16) **The Southern Margin of the Shield and Beyond: New Insights on the Precambrian Geology of the Midwestern U.S.:** Val W. Chandler

(#17) **Deep Ocean Black Shales: Organic Geochemistry and Paleooceanographic Setting:** Philip A. Meyers and Richard M. Mitterer

TUESDAY, NOVEMBER 1 8:00 a.m.–12:00 noon

(#8) **Quaternary Dating Methods:** Quaternary Geology and Geomorphology Division; Don J. Easterbrook

(#22) **Fluid Flow in Crystalline Rocks at High Temperatures:** Maria Luisa Crawford

1:30–5:30 p.m.

(#1) **Late Glacial Environments of Early Man in North America:** Archaeological Geology Div.; H. W. Borns, Jr.

(#3) **Geologic Disposal of Radioactive Wastes:** Engineering Geology Division; Lokesh Chaturvedi

(#7) **Planetary Volcanism:** Planetary Geology Division, Mineralogical Society of America, and Geochemical Society; Robin Brett

WEDNESDAY, NOVEMBER 2 8:00–12:00 noon

(#13) **Silicate-Oxide and Silicate–Native Element Interactions in Igneous and Metamorphic Rock:** Mineralogical Society of America; B. Ron Frost and Cornelis Klein

(#14) **Recent Advances in Geomorphology/Implications for Instruction:** National Association of Geology Teachers; Marvin E. Kauffman and Dale F. Ritter

(#15) **Frontiers in Paleontology: 1983:** Paleontological Society; Erle G. Kauffman and A. R. Palmer

1:30–5:30 p.m.

(#4) **Gravity, Buoyancy, and Lithospheric Study;** William E. Bonini and William Hinze

(#11) **Some Geochemical Problems in the People's Republic of China:** Geochemical Society; Robin Brett

(#12) **Roles and Responsibilities in Geoscience Information:** Geoscience Information Society; Unni Rowell

(#15) continued

(#18) **Mesozoic Magmatism in Eastern North America:** J. Gregory McHone and Paul C. Ragland

THURSDAY, NOVEMBER 3 8:00–12:00 noon

(#9) **Structure and Tectonics of Continental Interiors:** Structural Geology Division; Richard H. Groshong, Jr. and Donald Steeples

(#19) **Geology and Hydrogeology of the Teays-Mahomet Bedrock Valley System:** W. N. Melhorn and John P. Kempton

Short Courses, Forums, Workshops

Short Courses

CARBONATES: MINERALOGY AND CHEMISTRY

Fri., Oct. 28, 8:00 a.m.—5:00 p.m., Sat., Oct. 29, 8:00 a.m.—5:00 p.m., and Sun., Oct. 30, 8:00 a.m.—12:00 noon, Hyatt Regency. Introductory cocktail party Thurs., Oct. 27, 8:00 p.m., Hyatt Regency. Sponsored by MSA.

Emphasis will be on low-temperature carbonates, although lectures on high T and P phase equilibria and occurrences will be included as they are of general interest. The program includes intensive reviews of the following topics: crystal chemistry and phase relations of rhombohedral and orthorhombic carbonates, dissolution and precipitation phenomena, stability and occurrences of magnesian calcites, trace elements and stable isotope compositions, defect structures in natural carbonates, and metamorphic carbonates. Speakers include E. J. Essene (University of Michigan), J. R. Goldsmith (University of Chicago), F. T. Mackenzie (University of Hawaii), J. W. Morse (Texas A&M University), R. J. Reeder (State University of New York, Stony Brook), J. A. Speer (Virginia Polytechnic Institute), J. Veizer (University of Ottawa), and H. R. Wenk (University of California, Berkeley). The lectures will form the basis of Volume 11 of the MSA series *Reviews in Mineralogy*. Further information: R. J. Reeder, Department of Earth and Space Sciences, State University of New York, Stony Brook, NY 11794, (516) 246-7667 or 6541. Fee: MSA members—professional, \$125; student \$80; nonmembers—professional, \$155; student, \$90.

DESIGN AND IMPLEMENTATION OF MICROCOMPUTER-BASED INSTRUCTIONAL MODELS

Sun., Oct. 30, 9:00 a.m.—4:00 p.m., Hyatt Regency. Sponsored by NAGT.

The focus will be on how microcomputers can be used in geological education. Topics to be included: How to make the proper hardware choice, pros and cons of various languages, the types of developmental software required to create professional-level programs, what you can and cannot do with graphics (including a discussion of costs and benefits of color graphics), what is required to produce animated sequences, what every instructional, interactive module must include, how to choose and evaluate software, and how to develop professional-quality color slides on your microcomputer. Instructors: H. Robert Burger, Chairman, Department of Geology, Smith College, Northampton, MA 01063. Further information: Marvin E. Kauffman, Department of Geology, Franklin & Marshall College, Lancaster, PA 17604, (717) 291-4133, or H. Robert Burger. Fee: \$75.

MINERAL-FLUID EQUILIBRIA IN HYDROTHERMAL SYSTEMS

Wed., Oct. 26, 9:00 a.m., to Sun., Oct. 30, 12:00 noon, Airport Hilton Inn. Sponsored by SEG.

Intensive "how to" course on the computation of mineral-fluid equilibria in hydrothermal systems. The methodology that has evolved through the study of modern geothermal systems has been adapted to epithermal and other hydrothermal environments. Although real examples will be chosen where practical, the emphasis will be on techniques and methodology rather than on site-specific geologic interpretations. Subjects to be covered include (1) computation of the chemical, physical, and isotopic characteristics of subsurface environments from mineral chemistry and analyses of waters from springs, boreholes, and fluid inclusions; (2) construction, application, and limitations of activity-activity diagrams; (3) estimations of the physical and chemical character of magmatic emanations from mineral equilibria; (4) speciation of metals and sulfur in hydrothermal systems and computation of mineral solubilities; (5) recognizing and coping with disequilibrium; (6) mixing of solutions; (7) consequences of boiling; (8) typical depositional conditions for epithermal, massive sulfide, and Mississippi Valley environments. Applicant's education should include at least a course in physical chemistry or equivalent training in geochemistry. Procedures will require extensive use of programmable hand-held HP41CV calculators, which applicants should bring. Instructors: R. N. Henley, Geothermal Research Centre, Wairakei, New Zealand; A. H. Truesdell, USGS, Menlo Park, CA; P. B. Barton, USGS, Reston, VA; and J. A. Whitney, University of Georgia, Athens, GA. Fee: \$350, includes lodging Oct. 26–29, lunches, and snacks. Early registration required. Applications: Lois Elms, c/o Western Experience, 745 Gilpin Drive, Boulder, CO 80303, (303) 499-2862. Further information: Paul Barton, USGS, MS 959, Reston, VA 22092, (703) 860-6601.

ORGANIC GEOCHEMISTRY OF CONTEMPORANEOUS AND ANCIENT SEDIMENTS

Fri., Oct. 28, and Sat., Oct. 29, 8:00 a.m.—5:00 p.m. and Sun., Oct. 30, 8:00 a.m.—12:00 noon, Canyon Inn at McCormack's Creek State Park (15 miles west of Bloomington).

Sponsored by SEPM Great Lakes Section. Course will consider theoretical and isotopic analyses used in defining the sources and fates of sedimentary organic materials. Discussion leaders: M. J. DeNiro, R. B. Gagosian, J. M. Hayes, I. R. Kaplan, W. G. Meinschein, W. K. Seifert. Fee: \$350, includes registration, 3 nights' lodging, and meals. Transportation will be provided from the Indianapolis Airport to the meeting site and back to downtown Indianapolis for the GSA Annual Meeting. Registration deadline: September 15, 1983. Further information: Gordon S. Fraser, Indiana Geological Survey, 611 North Walnut Grove, Bloomington, IN 47405, (812) 335-1381 or 2687.

SHORT COURSES (con't)

SPONGIOMORPHS—PORIFERA AND ARCHAEOCYATHA

Sun., Oct. 30, 8:00 a.m.—5:00 p.m. Sponsored by the Paleontological Society.

This course will include discussion of the comparative systematics, ecology, and evolution of the sponges and archaeocyathans; brief treatment of the spongiomorphs and of chaetetids (as possible sponges) will be included. Instructors: Sponges (modern and fossil)—Willard Hartmann, Robert Finks, Ronald West, George Clark, J. Keith Rigby; Stromatoporoids—Colin Stearn, Carl Stock, Al Fagerstrom; Archaeocyathids—Roland Gangloff, Françoise Debrenne. There is no fee. Course notes will be available for purchase at the session. Further information: J. Keith Rigby, Department of Geology, Brigham Young University, Provo, UT 84602, (801) 378-2457 or 3918.

STRAIN MEASUREMENT: TECHNIQUES AND TECTONICS IMPLICATIONS

Thursday evening, Nov. 3, through Sat., Nov. 5, 12:00 noon; Indiana University Campus, Bloomington. Sponsored by the Structural Geology and Tectonics Division.

Over the past ten years many new practical techniques for measuring rock strain have been developed, and as a result of these studies, major advances have been made in our understanding of the significance of small- and large-scale features of tectonically deformed rocks. The course will comprise review of the relationships between displacement and strain, and discussion of the most practical ways that strains can be determined in the field and in the laboratory. Particular emphasis will be given to an analysis of strain variation over a wide range of scales and to a discussion of the significance of these variations in terms of tectonics processes. Lectures and workshops will be held at the Indiana Memorial Union, University of Indiana, Bloomington. Accommodations will be at the Papler Hotel, Bloomington. Instructors: J. G. Ramsay (Geologisches Institut, ETH Zentrum, Zurich, Switzerland) and R. Kligfield (University of Colorado, Boulder). Fee: \$150, includes lecture notes, charter bus transportation from Indianapolis to Bloomington on Nov. 3 and return to Indianapolis airport on Nov. 5, lodging, and all meals except breakfasts. Early registration suggested. Further information: Roy Kligfield, Department of Geological Sciences, University of Colorado, Boulder, CO 80309, (303) 492-7336 or 8141.

Forums

GSA EMPLOYMENT SERVICE FORUM: FUTURE EMPLOYMENT OPPORTUNITIES IN THE GEOLOGICAL SCIENCES

Mon., Oct. 31, 2:00—4:00 p.m.

Anyone interested in an overview of employment opportunities, salary scales, tips for successful interviews, and current trends in academia, government, industry, and consulting is cordially invited to attend. Six highly qualified panel members will speak briefly on

the outlook in their special areas and answer questions from the audience. Further information: Clara Hodgson, Membership Coordinator, GSA, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020.

NUCLEAR WASTE DISPOSAL ISSUES

Tues., Nov. 1, 5:30—7:00 p.m.

The GSA Committee on Geology & Public Policy will present a panel discussion, with audience participation, on nuclear waste issues of interest to geologists. The panel will consist of geologists from the Department of Energy, USGS, and a state geological survey, with a congressional representative on hand to explain the Nuclear Waste Policy Act of 1982. There will be ample opportunity for attendees to ask questions and to express opinions. The atmosphere will be informal; beer will be served.

Workshops

GEO-WRITING: QUICKLY. CLEARLY. CONCISELY.

Two one-day workshops on Sat., Oct. 29, 8:30 a.m.—5:00 p.m., and Sun., Oct. 30, 8:30 a.m.—5:00 p.m.. Sponsored by AGI.

The course includes how to break writer's block, how to write for different situations and publications, and how to write easily and clearly. Instructor: AGI's Wendell Cochran. Fee: \$75 advance, \$80 on-site. Further information: Wendell Cochran, *Geotimes*, 5205 Leesburg Pike, Falls Church, VA 22041, (703) 379-2480.

GEOSCIENCE INFORMATION COMES OF AGE: A GEOREF CELEBRATION

Tues., Nov. 1, 1:30—5:30 p.m.

Come to an extraordinary workshop; join the American Geological Institute staff in celebrating GeoRef's having made its first million—literature citations. This informal event will give you the opportunity to (1) learn more about the data base, (2) develop and discuss search strategies with experts, (3) win free search time, and (4) indulge in beer and pretzels. No preregistration or fees. For more information and a GeoRef demonstration, visit the AGI exhibit in Indianapolis or contact Julia Jackson, AGI, 1-800-336-4764 (toll-free).

TRACE FOSSIL CONCEPTS

Sat., Oct. 29, 8:00 a.m.—5:00 p.m.. Sponsored by SEPM.

This course will cover concepts and applications of trace fossils to environmental and sedimentological interpretations and as components of ancient ecosystems. Notes included. Speakers: A. Seilacher, R. W. Frey, C. K. Chamberlain, P. B. Basan, J. E. Warne, and others. Fee: \$125. Contact: Robin Dixon, SEPM, P.O. Box 4756, Tulsa, OK 74104, (918) 743-9765.

Field Trips

All field trip registrants must also register for the meeting or pay the nonregistrant fee provided on the field trip form.

Preregistration deadline: September 30, 1983

Preregistration for a field trip is very important. Use the official field trip registration form included in this announcement. **Full payment must accompany preregistration.** Unpaid purchase orders are not accepted as valid registration. **Field trip preregistration forms must be received at GSA headquarters, Boulder, no later than September 30, 1983.** On-site registration for trips originating in Indianapolis may be possible for those not fully subscribed. For trips originating outside Indianapolis prior to the meeting, late registration may be possible by contacting the Field Trip Coordinator or the Field Trip Chairman.

Nonregistrant Fee. Those wishing to participate in a field trip but not planning to attend the entire meeting must register using the nonregistrant rate indicated on the field trip registration form. Payment of this fee will entitle you to single, one-day meeting registration. Selection of the day for which you will register will be done on site. Payment cannot be refunded and is not transferable.

Trips are technical in nature and can be physically rigorous. Participants will be selected on a first-come, first-served basis.

Cancellation, Final day: October 7, 1983.

Cancellation or change of field trip reservations must be made in writing and must be received by the Field Trip Coordinator, GSA Headquarters, Boulder, **no later than October 7, 1983**, to be eligible for refund. All refunds will be subject to a \$10 processing fee. **Preregistrants please note:** There will be no refunds for premeeting trips after this date; refunds may be possible for postmeeting trips *only* if the reserved place is filled by on-site registration. There will be absolutely no refunds for those who register on site. In addition, there will be *no discount or refund for special travel arrangements* made by individuals in conjunction with any field trip. Personal vehicles are not permitted.

1983 FIELD TRIPS

All trips will begin and end in Indianapolis unless otherwise indicated in the field-trip descriptions. Trips originating in Indianapolis will depart from the east side of the Convention Center on Capitol Avenue, which is within one block of the Headquarters Hotel.

For those trips not originating in Indianapolis, participants

must make their own arrangements for transportation to the starting point.

Services: The cost of all trips includes the cost of transportation for the trip itself and the cost of the guidebook. It also includes the cost of other services as noted below by the following symbols: B, breakfast; L, box lunch; D, dinner; ON, overnight lodging; R, refreshments. Additional details will be provided on information sheets sent to all registrants. Information may also be obtained from the Field Trip Coordinator, GSA, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020, or from the Field Trip Chairman, Robert H. Shaver, Indiana Geological Survey, 611 North Walnut Grove, Bloomington, IN 47405, (812) 335-7428.

Weather and Clothing: Late October and early November weather in Indiana can range from very pleasant (sunny mild days and cool nights) to bad (cold and rainy), although the average expectation is for nice weather. Participants should bring clothing that will keep them warm and dry should the poorer conditions prevail.

Hard Hats: In order to comply with federal regulations, insurance provisions, and company policies, participants on trips that enter pits, quarries, and mines must bring their own hard hats; companies will not be asked to provide them. Regulations also provide for the wearing of safety glasses and hard-toed field-type shoes. *Trips 1, 2, 3, 5, 8, 9, 12, 13, 15, and 16 will require hard hats.*

PREMEETING

1. The Paleozoic Systemic Boundaries of the Southern Indiana-Adjacent Kentucky Area and Their Relations to Depositional and Erosional Patterns—Carl B. Rexroad and Henry H. Gray, Indiana Geological Survey, Bloomington, and Anne V. Noland, University of Louisville.

A series of sections across Paleozoic systemic boundaries in the southern half of Indiana and in the Louisville area illustrate regional depositional and erosional patterns and the stratigraphy of associated formations. Included are complex deformation of Ordovician and Silurian rocks, the Middle Silurian-Middle Devonian paraconformity, both erosion and continuity of deposition associated with the Devonian-Mississippian boundary, and the greatly changing magnitude of the Mississippian-Pennsylvanian unconformity. (Limit, 35; 3 days, Fri., Oct. 28, to Sun., Oct. 30; fee, \$160: 1B, 3L, 1D, 2ON, R)

2. Paleontology and Stratigraphy of the Borden Delta of Southern Indiana and Northern Kentucky—N. Gary Lane, Indiana University, Bloomington; William I. Ausich, Wright State University, Dayton, Ohio; and Thomas W. Kammer, West Virginia University, Morgantown (Paleontological Society).

Precursor basinal and prodeltaic rocks will be examined in the Louisville, Kentucky, area at Button Mold Knob and in the Coral Ridge



and Solite Quarries; a virtually complete exposure of the Borden delta will be seen near Millport Knob in southern Indiana; and delta-platform carbonate banks and associated rocks around Lake Monroe will be examined. A major objective will be to understand the relationship between deltaic sedimentation and benthic community paleoecology. The trip will end in Indianapolis on Saturday evening so that participants may attend the Paleontological Society short course on Sunday, October 30. (Limit, 35; 2 days, Fri., Oct. 28, to Sat., Oct. 29; fee, \$70: 2L, 1ON, R)

3. Stratigraphy of the Wedron and Trafalgar Formations (Wisconsinan) in East-Central Illinois and West-Central Indiana—John P. Kempton, Illinois State Geological Survey, Champaign; Ned K. Bleuer, Indiana Geological Survey, Bloomington; and W. Hilton Johnson, University of Illinois, Urbana (Quaternary Geology and Geomorphology Division).

Trip participants will examine the stratigraphic, lithologic, and facies evidence for a proposed threefold subdivision of the Wedron Formation (Lake Michigan Lobe) by visiting new and classic sections between Peoria and Danville, Illinois, and by studying subsurface cores. Also, they will trace the Wedron stratigraphy into Indiana to view the characteristics of the Trafalgar Formation (eastern source) and its relationship to the Wedron. Participants may either leave by chartered bus from Indianapolis late Friday afternoon, October 28, and travel to Peoria (overnight) or assemble in Peoria on Saturday morning, October 29. (Limit, 44; 2 days, Sat., Oct. 29, to Sun., Oct. 30; fee, \$125: 2B, 2L, 1D, 2ON, R)

4. Precambrian Geology South of Lake Superior—Campbell Craddock, University of Wisconsin, Madison; Michael G. Mudrey, Jr., Wisconsin Geological and Natural History Survey, Madison; and Timothy B. Holst, University of Minnesota, Duluth (Structural Geology and Tectonics Division).

Assemble Thursday evening, October 27, in Duluth, Minnesota, and end Sunday afternoon, October 30, in Indianapolis. This traverse of a complex Precambrian terrane will emphasize structural geology and evidence for four cycles of deformation. Stops include the folded Thomson Formation (middle Precambrian) near Duluth; the Duluth gabbro complex; the Douglas fault; lower, middle, and upper Precambrian igneous and sedimentary rocks of the Gogebic Range; and igneous and metamorphic rocks of central Wisconsin. (Limit, 44, 3 days, Fri., Oct. 28, to Sun., Oct. 30; fee, \$205: 3B, 3L, 1D, 3ON, R)

5. Geology of the Kentland Dome Structurally Complex Anomaly, Northwestern Indiana—An Intimate Look into the Core—Raymond C. Gutschick, University of Notre Dame, Notre Dame, Indiana.

A single quarry, about 100 acres in area and 330 feet deep, has a continuous sequence of more than 1,000 feet of Ordovician and Silurian rocks. The oldest rocks have been uplifted more than 2,000 feet. Deformation is intense, with plunging folds and spectacular exposures of faults and fault zones in all their details. Strata are upended and feature breccias, shattercones, crushed quartz petrofabrics, and coesite(?). See the evidence for yourself—does it represent a natural impact event? (Limit, 37; 1 day, Sun., Oct. 30; fee, \$30)

6. Shoreline Processes and Geomorphology, Southwestern Lake Michigan—Charles Collinson, Ardith K. Hansel, and Rodney D. Norby, Illinois State Geological Survey, Champaign, and others (Quaternary Geology and Geomorphology Division).

Beginning in Chicago, on Saturday, October 29, participants will study the dynamics of coastal processes along the Lake Michigan shore and their role in shaping the southwestern bluffs and beaches. The effects of wave climate, weather, lake levels, sediment supply, materials composition, and

coastal structures will be illustrated. The history of the shore, from the time of glacial retreat through the development of ancient and modern features, will be traced, and implications for shore management and planning will be detailed. An overview of the shore will be made from the Hancock Tower, and, weather permitting, via a lake cruise. The trip will end in Indianapolis, on Sunday, October 30. (Limit 37; 2 days, Sat., Oct. 29, to Sun., Oct. 30; fee, \$150: cruise fee of \$25 to be refunded if weather intervenes; 1B, 1L, 1D, 1ON, R)

7. Ground-Water Hydrology and Geomorphology of the Mammoth Cave Region, Kentucky, and of the Mitchell Plain, Indiana—Ralph O. Ewers, Eastern Kentucky University, Richmond; Noel Krothe, Indiana University, Bloomington; Richard L. Powell, Geosciences Research Associates, Inc., Bloomington; and James F. Quinlan and Joseph A. Ray, National Park Service, Mammoth Cave, Kentucky (Quaternary and Geomorphology Division and Hydrogeology Division).

Trip participants will meet in Louisville on Wednesday night, October 26. They will review the results of an intensive study of karst ground-water basins in the Mammoth Cave region and visit Mammoth Cave itself. Emphasis will be on methods of study and instrumentation, interpretation of data, and new concepts of ground-water movement. Participants will consider environmental problems of waste disposal and protection of water supplies and the geomorphology of the Sinkhole Plain in Kentucky. They will consider mineral springs, water chemistry and isotope composition, hydrology, and karst development of the Mitchell Plain in southern Indiana, and they will study the origin of terra rossa and the Lost River drainage system and its relationship to Middle Mississippian strata. The trip ends in Indianapolis on Sunday, October 30. (Limit, 36; 4½ days, Wed., Oct. 26, to Sun., Oct. 30; fee, \$190: 1B, 4L, 1D, 4ON, R)

8. Urban and Engineering Geology of the Indianapolis Area—Arthur Mirsky, Indiana University—Purdue University, Indianapolis, and Edwin J. Hartke, Indiana Geological Survey, Bloomington, with contributions from Curtis H. Ault and Gordon S. Fraser, Indiana Geological Survey; Bruce Bailey, ATEC Associates, Inc., Indianapolis; Konrad J. Banaszak, U.S. Geological Survey, Indianapolis; Thomas M. Bruns and James T. Strange, Indiana Division of Water, Indianapolis; Andrew Hagemesser, American Aggregates Corp., Indianapolis; and Karyl K. Schmidt, Indiana State Board of Health, Indianapolis (Engineering Geology Division).

The several emphases of this trip are (a) geologic setting of the Indianapolis area; (b) engineering problems and solutions in downtown Indianapolis; (c) drainage problems in residential areas of northern Indianapolis; (d) engineering geology of the Eagle Creek Dam and Reservoir, Marion County; (e) geohydrology of the Northside Landfill, Boone County; and (f) aggregates from open-pit and underground mines in the Indianapolis area. (Limit, 38; 1 day, Sun., Oct. 30; fee, \$20)

9. Origin and Economic Geology of the Springfield Coal Member in the Eastern Interior Basin—Donald L. Eggert and Denver Harper, Indiana Geological Survey, Bloomington; C. G. Maples, Indiana University, Bloomington; and Dana Meir, AMAX Coal Co., Keensburg, Illinois (Coal Geology Division).

The Springfield Coal Member of Indiana and Illinois (equivalent of Coal No. 9, western Kentucky) is one of the most economically important bituminous coals in the nation. Points of interest include three surface mines, one underground mine, the Galatia and Leslie Cemetery Channels, areas of deposition beyond channel influence, and the geochemical, sedi-

(continued page 124)

FIELD TRIPS (con't)

mentologic, and stratigraphic evidence used to demonstrate the relations among coal quality, mining conditions, and the depositional setting of a large shifting delta system. (Limit, 37; 2½ days, from late afternoon, Fri., Oct. 28, to Sun., Oct. 30; fee, \$125: 2L, 1D, 2ON, R)

10. Metalliferous Shales of the Illinois Basin—Raymond M. Coveney, Jr., University of Missouri at Kansas City, and Bertram G. Woodland and Rainer Zangerl, Field Museum of Natural History, Chicago (Society of Economic Geologists).

This trip will focus on the Middle Pennsylvanian black shales exposed in the Mecca and Logan Quarries in western Indiana. These organic-rich shales, which may have future importance to metal mining, are typical of metalliferous units commonly associated with midwestern coals. Metals are present in amounts as great as 0.2, 0.03, 1.0, and 1.4 percent for Mo, U, V, and Zn. Fossils include fish as large as the 9-foot shark described by Rainer Zangerl and Eugene Richardson in 1963. Field discussions of the distribution of the shales, their fossil contents, and their zoned metal values will be supplemented by examination of cores from throughout the Illinois Basin. (Limit, 37; 1 day, Sun., Oct. 30; fee, \$45: 1L, R)

11. The New Harmony Geologic Legacy—John B. Patton, Indiana University and Indiana Geological Survey, Bloomington (History of Geology Division).

During the period 1836 to 1860, David Dale Owen, pioneer geologist of the American Midwest, conducted from New Harmony, on the lower Wabash River in Indiana, studies that were to set the pattern for field investigations in 19th-century America. A walking tour pertinent to the sites, streets, and remaining historic structures in New Harmony will recall the contributions and associations, whether as residents or visitors, of such eminent geologists and naturalists as David Dale Owen, Richard Owen, Thomas Say, William Maclure, Gerald Troost, Alexander LeSeur, Joseph Norwood, Leo Lesquereux, Edward Travers Cox, and Sir Charles Lyell. The trip begins Saturday evening, October 29, in New Harmony (convenient for air travelers via Evansville) and ends in Indianapolis on Sunday, October 30. (Limit, 39; 1½ days, Sat., Oct. 29, to Sun., Oct. 30; fee, \$50: 1B, 1ON)

POSTMEETING

12. Silurian Reef and Interreef Strata as Responses to a Cyclical Succession of Environments, Southern Great Lakes Area—Robert H. Shaver, Indiana University and Indiana Geological Survey, Bloomington, and Jack A. Sunderman, Indiana University—Purdue University, Fort Wayne; Joanne Kluessendorf and Donald G. Mikulic, Illinois State Geological Survey, Champaign; James E. McGovney, Exxon Production Research Co., Houston, Texas; and Lloyd C. Pray, University of Wisconsin, Madison.

The classic Silurian reef and interreef outcrop area extending from western Ohio, into northeastern Illinois, including the Thornton Quarry, will be examined in light of stratigraphic and sedimentologic interpretations that propose Middle to Late Silurian age, alternating nonrestricted and restricted environments distantly related to cyclic carbonate-evaporite deposition in the Michigan and Appalachian Basins, variably deep to very shallow water depths, and reef geometries and zonations as responses to such environmental influences. (Limit, 35; 3 days, from 4:00 p.m., Thurs., Nov. 3, to 4:00 p.m., Sun., Nov. 6; fee, \$155: 2L, 1D, 3ON, R)

13. History of Pleistocene Alluviation of the Middle and Upper Wabash Valley—Gordon S. Fraser and Ned K.

Bleuer, Indiana Geological Survey, Bloomington, and Norman D. Smith, University of Illinois Chicago Circle (Quaternary Geology and Geomorphology Division).

The purpose of this trip is to reconstruct the history of late Wisconsinan sedimentation in the middle and upper Wabash Valley. Sediments include those deposited by braided streams, on alluvial fans, in lakes, as debris flows, and by catastrophic floods. They date from the Woodfordian Subage, when complex interaction of ice lobes from the north and the east were shaping the present course of the Wabash River. Participants will examine facies of the various deposits, study their lateral and vertical relationships, and explore the relationships between successive periods of glacial and meltwater deposition in the Great Bend area. (Limit, 35; 2 days, 8:00 a.m., Fri., Nov. 4, to Sat., Nov. 5; fee, \$90: 1B, 2L, 1ON, R)

14. Archaeological Geology of the Wyandotte Cave Region, South-Central Indiana—Henry H. Gray, Indiana Geological Survey, Bloomington; John L. Bassett, Geosciences Research Associates, Inc., Bloomington; and Cheryl A. Munson and Patrick J. Munson, Indiana University, Bloomington (Archaeological Geology Division).

Stratigraphy and geomorphology of the Wyandotte Cave region will be examined as background to visits to prehistorically utilized parts of the cave itself and to deeply stratified habitation sites on the flood plain of the Ohio River nearby. Emphasis will be on sources and utilization of local chert resources and on the influence of local geologic factors on habitation patterns. The first night stop, for those who choose, will be in Bloomington, where participants may tour the Glenn Black Laboratory at Indiana University. Participants may leave by chartered transportation from Indianapolis on Thursday afternoon, Nov. 3, and spend the night in Bloomington, or they may join the trip at 8:00 a.m., Friday, Nov. 4. (Limit, 32; 2½ days, from 5:00 p.m., Thurs., Nov. 3, to Sat., Nov. 5; fee, \$100: 1L, 1ON for Nov. 4 only)

15. Lithostratigraphy, Mineralogy, and Geochemistry of the New Albany Shale (Devonian and Mississippian) in Southeastern Indiana—Nancy R. Hasenmueller, R. K. Leininger, and Nelson R. Shaffer, Indiana Geological Survey, Bloomington.

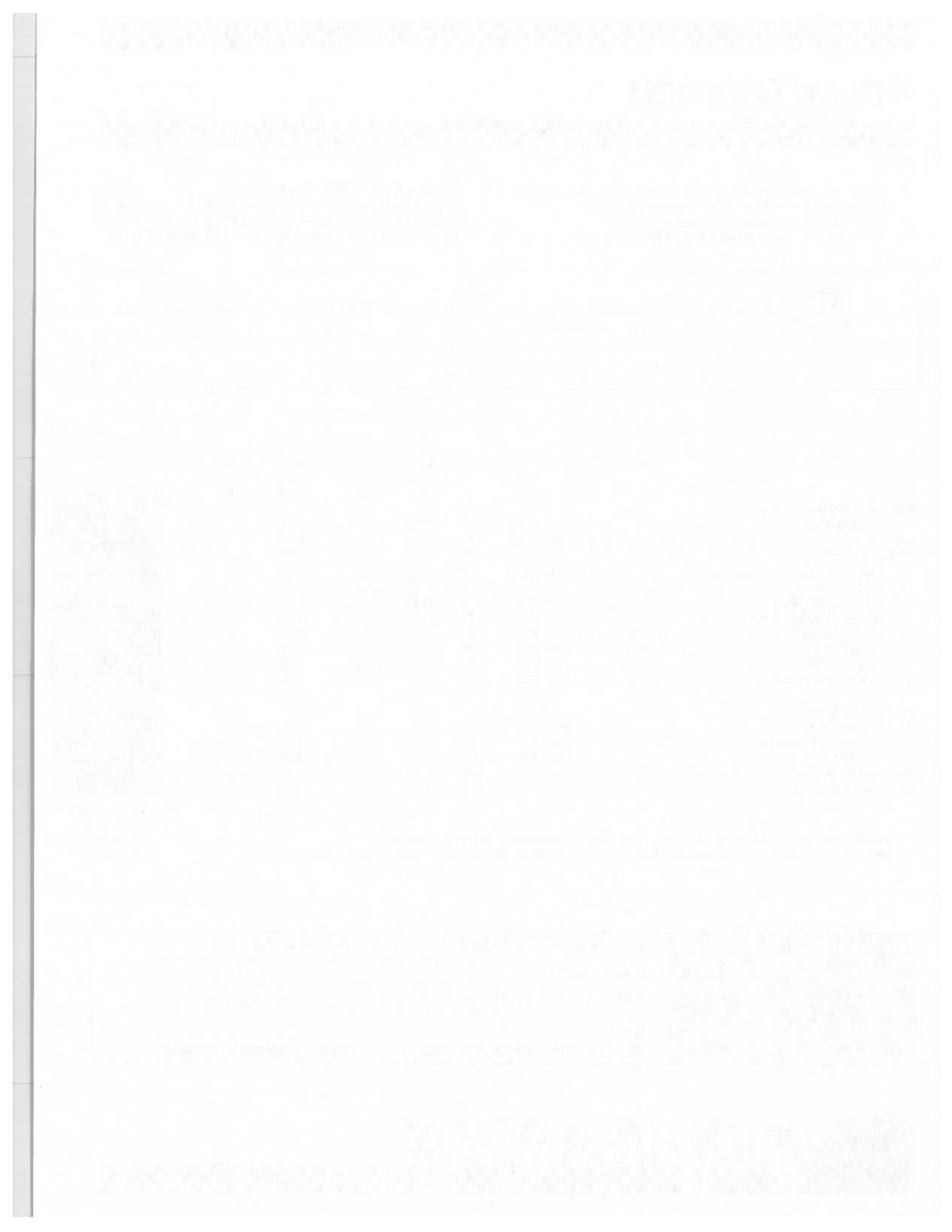
Participants will examine exposures of the New Albany Shale, including type sections of several members and beds, in southeastern Indiana. Trip leaders will present the results of recent research on the lithostratigraphy, mineralogy, and geochemistry of selected outcrops and cores of the shale, and they will discuss areas where the New Albany has the greatest potential for oil production. (Limit, 35; 1 day, Fri., Nov. 4; fee, \$38: 1L, R)

16. The Salem Limestone in the Indiana Building-Stone District—John B. Patton and Donald D. Carr, Indiana Geological Survey, Bloomington (Society of Economic Geologists).

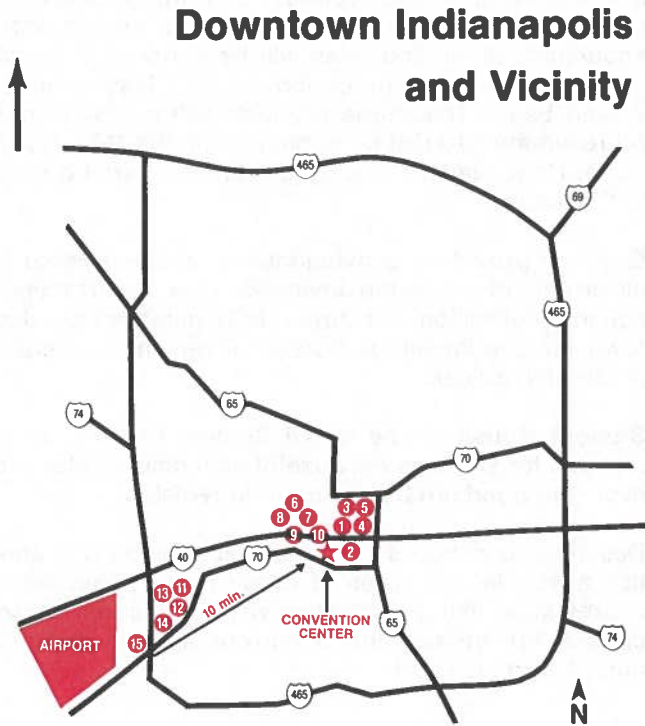
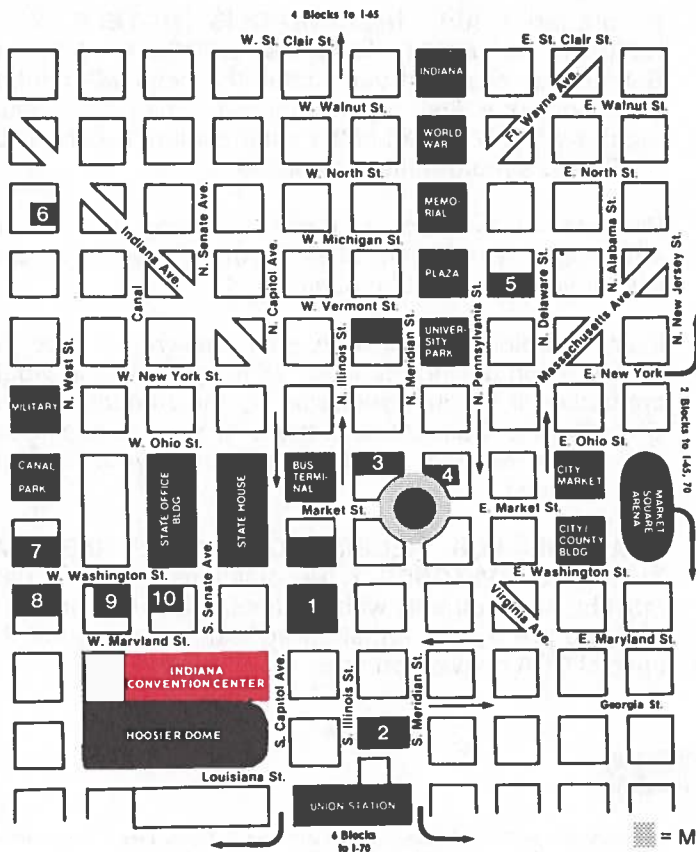
Travel along highways and county roads between Bloomington and Bedford will give participants the opportunity to view active and abandoned dimension-stone quarries in a district that has produced most of the nation's dimension limestone for the past century. Exposures of the Salem Limestone in the quarries will be used to point out the unusual depositional conditions that produced a relatively pure limestone, nearly free of parting surfaces, that in places exceed 80 feet in thickness. Participants will view the process of separating 200-ton masses from the ledge and division of these huge "cuts" into mill blocks and then follow the stone through various milling processes to produce sawed, cut, turned, planed, carved, and split pieces for traditional and contemporary architecture. (Limit, 37; 1 day, Fri., Nov. 4; fee, \$25: 1L, R)



INDIANAPOLIS



Hotel Guide



GSA HOTEL RATES

All rooms subject to 10% room tax.

	Single	Double or twin	Rollaways for triples or quads	No. of rooms in GSA block
1. HYATT REGENCY (Headquarters)	\$63	\$78	+\$10	425
2. Atkinson Hotel	40	46	6	200
3. Hilton at the Circle	50	60	10	325
4. Columbia Club	36 & 44	36 & 44	5	65
5. Essex Hotel	30	40	6	100
6. IUPUI Student Union	21	23	3	62
7. Holiday Inn (Downtown)	34	38	8	100
8. Howard Johnson's (Downtown)	36	40-44	6	175
9. Travelodge (Downtown)	30	36-42		75
10. Statehouse Inn (Downtown)	25	25		50
11. Regal 8 (Airport)	18	27		75
12. Rodeway Inn (Airport)	29	34		75
13. Ramada Inn (Airport)	36	36	6	75
14. Quality Inn (Airport)	34	39		150
15. Holiday Inn (Airport)	32	38		150

Suite information is available by calling individual hotels. Ranges: Hyatt Regency—\$150-475; other hotels—\$ 80-200.

Housing

The Indianapolis Convention & Visitors Bureau will coordinate ALL hotel reservations. Your choice of hotel accommodations and rates will be honored, if possible, although rooms will be confirmed on a first-come, first-served basis. Telephone requests will not be honored. All reservations must be submitted on the GSA Housing Form. Cancellations should be made in writing directly to the hotel.

GSA will provide a convenient free shuttle system from all airport hotels into the downtown area. See Transportation for information. The airport is 10 minutes from downtown, making the airport hotels convenient; they are also moderately priced.

Student Housing. The IUPUI Student Union is recommended for students because of economical rates. However, **you need not be a student to register.**

Descriptions of hotels are given below, along with amenities available and types of credit cards accepted (see abbreviation list). Most hotels will also accept personal checks, but be sure that a current address and phone number are included.

Be prepared: **ALL INDIANAPOLIS HOTELS WILL REQUIRE A FIRST NIGHT'S DEPOSIT.** After the Bureau has assigned your hotel, the hotel will confirm and request a first night's deposit, which they must receive within 2 weeks of the confirmation. Hotels **WILL NOT** hold a room without a deposit.

Refunds will be made to those canceling 48 hours in advance of reservation dates. If you cancel, be sure to ask for your cancellation number.

If any problems occur with your reservation, see the GSA host on duty in the lobby of your hotel. GSA would appreciate it if you would stop by the Annual Meeting Office in the Convention Center, at your convenience during the meeting, to let us know how your problem was resolved.

DEADLINE FOR RECEIPT OF HOTEL RESERVATIONS IS OCTOBER 7. Reservations after that date must be made directly with the hotel. Be sure to indicate that you are a GSA registrant to take advantage of the special GSA convention rate.

HOTELS

1. **HYATT REGENCY** (Headquarters). A beautiful 6-year-old hotel featuring the largest (20-story) open atrium in the country. There are many restaurants and cocktail lounges, including the Eagle's Nest and Harrison's, for fine dining, and several quick food eateries (including McDonald's). Levels I-III offer shopping and lounging. Room service to 9:30 p.m. Parking available at \$4.25/day. Access to Nautilus at \$5/day. Concierge service. Check-out by 12 noon. CC: AX, MC, V, D, CB.

2. **ATKINSON.** One block to Convention Center. Features traditional accommodations with gracious antiques. Free outdoor parking. Free in-house movies. Free access to health club. Restaurant open to 10 p.m. Cocktail lounge with entertainment. Room service to 9 p.m. Check-out by 1 p.m. CC: AX, MC, V, D, CB.

3. **HILTON.** Three blocks to Convention Center. Parking (\$3/day). Restaurants open to 11 p.m. Cocktail lounges with entertainment. Room service to 10 p.m. Check-out by 1 p.m. CC: AX, V, MC, D, CB.

4. **COLUMBIA CLUB.** Four blocks to Convention Center. This is a private club with elegant Tudor atmosphere. Request a basic "standard" room or a renovated, recently decorated "executive" room. Parking (at fee). Restaurants open to 10 p.m. (check dress code). Cocktail lounge with entertainment. Health club (men only). Room service to 10 p.m. Check-out by 12 noon. Hotel recently added to National Register as Historic Landmark. C: AX ONLY.

5. **ESSEX.** Eight blocks to Convention Center. (GSA shuttle.) Free parking. Restaurants open to 10 p.m. Cocktail lounge with entertainment. Room service to 10 p.m. Grocery & deli. Free in-house movies. Check-out by 12 noon. CC: AX, V (for deposits); AX, MC, V, CB, D (for check-out).

6. **Indiana University-Purdue University at Indianapolis (IUPUI) STUDENT UNION.** Eight blocks to Convention Center. On-campus. Not on GSA shuttle route to Convention Center. IUPUI Express bus available to downtown and return between 7:00 a.m. and 5:30 p.m.; fee is 25 cents one way; picks up in front of building. No student ID required for reservation. Roommate requests taken. Food service available until 7 p.m. Free access to pool, health club, and game room. Check-out by 1 p.m. Full payment required at check-in by personal check, Mastercard, or Visa.

7. **HOLIDAY INN.** Three blocks to Convention Center. Free parking. Restaurant

open to 9:30 p.m. Cocktail lounge. Room service to 9:30 p.m. Free in-house movies. Check-out by 11 a.m. CC: AX, V, MC, D, CB.

8. **HOWARD JOHNSON'S.** Three blocks to Convention Center. Free Parking. Complimentary fruit basket. 24-hour restaurant. Cocktail lounge with entertainment. Room service to 9 p.m. Free in-house movies. Game room. Check-out by 12 noon. CC: AX, V, MC, D, CB.

9. **TRAVELODGE.** Two blocks to Convention Center. 24-hour restaurant. Free parking. Free in-house movies. Check-out by 12 noon. CC: AX, V, MC.

10. **STATEHOUSE INN.** Two blocks to Convention Center. Basic accommodations. Cocktail lounge (serves sandwiches). Free parking. Free in-house movies. Check-out by 1 p.m. Personal checks ONLY for advance deposit. CC: AX, MC, V, D (at check-out).

11. **REGAL 8 (Airport).** (GSA shuttle.) Nearby McDonald's. Color TVs. Full payment required at check-in. Check-out by 1 p.m. CC: AX, V, MC, D.

12. **RODEWAY INN (Airport).** (GSA shuttle.) Free parking. Restaurants open to 10 p.m. Cocktail lounge with entertainment. Indoor pool, health club, and game room. Free HBO-TV. Check-out by 12 noon. CC: AX, MC, V, D.

13. **RAMADA INN (Airport).** (GSA shuttle.) Free parking. Restaurant open to 10 p.m. Room service to 10 p.m. Cocktail lounge. Indoor pool and health club. Check-out by 12 noon. CC: AX, V, MC.

14. **QUALITY INN (Airport).** (GSA shuttle.) Free parking. Restaurant open to 9 p.m. Room service to 9 p.m. Cocktail lounge with entertainment. Free in-house movies. Check-out by 12 noon. CC: V, MC, AX, D.

15. **HOLIDAY INN (Airport).** (GSA shuttle.) Free outdoor parking. Excellent restaurant open to midnight. Cocktail lounge with entertainment. Free HBO-TV. 24-hour room service. Check-out by 12 noon. CC: V, MC, AX, D.

ABBREVIATIONS

CC = Credit Card; AX = American Express; V = Visa; MC = Mastercard; CB = Carte Blanche; D = Diners Club

Official Housing Form

PLEASE COMPLETE AND RETURN BY OCTOBER 7 TO:

**GSA HOUSING BUREAU
100 SOUTH CAPITOL AVENUE
INDIANAPOLIS, IN 46225**

PLEASE PRINT OR TYPE:
HOTEL/MOTEL PREFERENCE

1. _____ 2. _____ 3. _____

TYPE OF ACCOMMODATIONS

(send one reservation form per room)

- | | |
|---|---|
| <input type="checkbox"/> Single (1 bed, 1 person) | <input type="checkbox"/> 1 Bedroom Suite |
| <input type="checkbox"/> Double (1 bed, 2 persons) | <input type="checkbox"/> 2 Bedroom Suite |
| <input type="checkbox"/> Twin (2 beds, 2 persons) | <input type="checkbox"/> Add rollaway to room |
| <input type="checkbox"/> Triple (2 beds, 3 persons) | RATE REQUESTED* _____ |
| <input type="checkbox"/> Quad (2 beds, 4 persons) | <i>*Subject to 10% room tax.</i> |

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

NAMES OF OCCUPANTS

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

MAIL CONFIRMATION TO:

Name _____ Phone _____ / _____
University or Company _____
Address _____
Street City State Zip

1. Make reservations by October 7. Reservations after this date are on a space-available basis only.
2. First night's deposits may be required. Credit cards and checks will be accepted. Deposit due after hotel confirmation is received.
3. Notify hotel directly for changes in arrival/ departure or type of accommodations.
4. Cancellation 48 hours in advance is required for refund. Request cancellation number at that time.
5. Room assignments are made in the order received. If hotels of your choice are filled, the Housing Bureau will make the best arrangements elsewhere.
6. A confirmation is *not* a guarantee. To guarantee your room past 6 p.m., notify the hotel of your credit card number.



THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
5800 S. UNIVERSITY AVENUE
CHICAGO, ILLINOIS 60637

TO: THE DIRECTOR, NATIONAL BUREAU OF STANDARDS
4300 RESISTANCE AVENUE
GAITHERSBURG, MARYLAND 20885

FROM: DR. J. H. GOLDSTEIN
DEPARTMENT OF CHEMISTRY
THE UNIVERSITY OF CHICAGO
5800 S. UNIVERSITY AVENUE
CHICAGO, ILLINOIS 60637

SUBJECT: 13C NMR SPECTROSCOPY OF POLYMERIZATION PRODUCTS

Enclosed for your information are two copies of a report on the 13C NMR spectra of polymerization products. The report is a preliminary report and is not intended for publication. It contains the following information:

1. A list of the polymerization products studied.

2. The 13C NMR spectra of these products.

3. The assignments of the peaks in the spectra.

4. A discussion of the results.

Very truly yours,
J. H. Goldstein

DR. J. H. GOLDSTEIN
DEPARTMENT OF CHEMISTRY
THE UNIVERSITY OF CHICAGO
5800 S. UNIVERSITY AVENUE
CHICAGO, ILLINOIS 60637

Transportation and GSA/Viking Airline Reservation System

GSA/VIKING AIRLINE RESERVATION SYSTEM

For the second consecutive year, the Geological Society of America has designated Viking Travel, Ltd. of Boulder, Colorado, as the sole airline reservation agent for the 1983 Annual Meeting in Indianapolis. Those of you who used Viking's services in 1982 benefited from both the economical airfares you received and the on-site assistance during the meeting.

For 1983, Viking has once again negotiated reduced-rate airfares with fewer travel restrictions specifically for the GSA membership. In general terms, those departing from west of the Mississippi will pay fares that are 40% less than regular coach fares. Those departing from most cities on the Eastern Seaboard will pay fares that are 45% less than regular coach fares.

Air service into Indianapolis, especially from the West Coast, is limited. Consequently, we strongly recommend that you call immediately to make your reservations. In addition, airfares are increasing at a rapid pace, and early reservations will protect you from further fare increases.

PROCEDURES

1. Call Viking toll-free at (800) 525-0368 (Viking's regular number is 303-449-6983). Call Monday through Friday, 8:30 a.m. to 5:30 p.m.
2. Identify yourself as attending the GSA Indianapolis Annual Meeting and request a reservation from your departure city.
3. The Viking agent will immediately confirm your reservations and quote you the applicable deep-discount fare.
4. Payment options are
 - a. Check payable to Viking Travel, Ltd.
 - b. Major credit card.
 - c. Invoice to your firm.
5. Delivery will be via first-class mail. Tickets will be mailed upon receipt of payment or credit card authorization.

6. In the event of a decrease in your airfare, Viking will re-ticket you at the lower fare. However, the only protection against increasing airfares is to purchase your ticket today.

That's all there is to it!

Viking agents are familiar with the various amenities offered by each of the major hotels in Indianapolis, and they will gladly answer your questions regarding your specific needs.

Viking representatives will provide a Customer Service desk at the headquarters hotel in Indianapolis to assist you with reservation changes, sightseeing information, and meeting schedules and locations.

We look forward to seeing you in Indianapolis!

TRANSPORTATION

GSA Shuttle. GSA will provide a full transportation system via Metro bus lines. There will be no charge for the service, and it is prepared to transport you at convenient intervals from airport to hotel, hotel to hotel, hotel to convention center, and back to the airport. A complete day and evening shuttle schedule will be included in your Program and also in hotel lobbies.

Sunday, October 30, the airport to hotel shuttle will depart from the front of the airport on the hour and half-hour from 12:00 noon to 11:00 p.m.

If your arrival is outside of this schedule, we suggest (1) a cab at \$7.50 plus \$1 per person additional (plus tip) OR (2) a call to your hotel requesting that they pick you up. Almost all GSA hotels offer this complimentary service.

Most of the hotels downtown are within walking distance of the Convention Center, Monument Circle, and downtown department stores. A taxi-for-one to suburban shopping malls will cost about \$12.00 plus tip. A taxi is recommended for travel to suburban areas and for travel after dark.



CONTENTS OF TECHNICAL PROGRAM

SYMPOSIA

(1) Archaeological Division: Late Glacial Environments of Early Man in North America	Nov. 1
(2) Coal Division: Paleoclimatic Controls on Coal Resources of the Pennsylvanian System of North America	Oct. 31
(3) Engineering Division: Geologic Disposal of Radioactive Wastes	Nov. 1
(4) Geophysics Division: Gravity, Buoyancy, and Lithospheric Studies	Nov. 2
(5) History Division: Some Significant Geologic Ideas Originating from the Study of Cratons	Oct. 31
(6) Hydrogeology Division/SEG: (Centennial Symposium). Hydrodynamics and Geochemistry of Ore Generation in Sedimentary Environments	Oct. 31
(7) Planetary Division, GS, MSA: Planetary Volcanism	Nov. 1
(8) Quaternary and Geomorphology Division: Quaternary Dating Methods	Nov. 1
(9) Structure & Tectonics Division: Structure and Tectonics of Continental Interiors	Nov. 3
(10) Cushman Foundation: Miocene Paleogeography	Oct. 31
(11) GS: Some Geochemical Problems in the Peoples Republic of China	Nov. 2
(12) GIS: Roles and Responsibilities in Geoscience Information	Nov. 2
(13) MSA: Silicate-Oxide and Silicate-Native Element Interactions in Igneous and Metamorphic Rock	Nov. 2
(14) NAGT: Recent Advances in Geomorphology Implications for Instruction	Nov. 2
(15) PS: Frontiers in Paleontology: 1983	Nov. 2
(16) Southern Margin of the Shield and Beyond: New Insight on the Precambrian Geology of the Midwestern U.S.	Oct. 31
(17) Deep Ocean Black Shales: Organic Geochemistry and Paleo-Oceanographic Setting	Oct. 31
(18) Mesozoic Magmatism in Eastern North America	Nov. 2
(19) Geology and Hydrogeology of the Teays-Mahomet Bedrock Valley System	Nov. 3
(20) Evolutionary and Environmental Significance of Skeletal Growth Patterns	Oct. 30
(21) Stable Isotope Studies of Clastic Rocks	Oct. 30
(22) Fluid Flow in Crystalline Rocks at High Temperatures	Nov. 1
(23) Tenth Annual/Geochemical Cycles	Oct. 30

ORAL PRESENTATIONS

Archaeological Geology	Nov. 2
Coal Geology	Oct. 31
Economic Geology I	Nov. 1
Economic Geology II	Nov. 1
Economic Geology III	Nov. 2
Economic Geology IV	Nov. 3
Engineering Geology/History of Geology	Oct. 31
Environmental Geology	Nov. 2
Experimental Petrology: Mineral Thermometry, Silicate Melts, Fluids and Metamorphism	Nov. 3
General Geology I	Oct. 31
General Geology II	Nov. 1
Geochemistry I: Organic and Low Temperature Isotope Geochemistry	Oct. 31
Geochemistry II: Low Temperature Aqueous Geochemistry	Nov. 1
Geochemistry III: Geochemistry of Igneous and Metamorphic Rocks	Nov. 2
Geochemistry IV: Hydrothermal Geochemistry	Nov. 3
Geochemistry V: Low Temperature Kinetics	Nov. 3
Geology Education	Nov. 3
Geomorphology I	Nov. 2
Geomorphology II	Nov. 3
Geophysics/Mathematical Geology	Nov. 3
Geoscience Information	Oct. 31
Hydrogeology I	Nov. 2
Hydrogeology II	Nov. 3
Igneous Petrology I: Mafic Magmas—Source Regions and Fractionation	Oct. 31
Igneous Petrology II: Granitic Magmas	Oct. 31
Igneous Petrology III: Subduction Zone Magmatism and Other Things	Nov. 1
Marine Geology I: Sedimentary Processes and Stratigraphy	Nov. 1
Marine Geology II: Paleocceanography	Nov. 1
Metamorphic Petrology I: Metamorphic Processes and P, T Conditions	Oct. 31
Metamorphic Petrology II: Mineral Reactions and Anatexis	Nov. 3
Micropaleontology	Nov. 1
Mineralogy I: Spectroscopy and Crystal Chemistry of Silicate and Non-Silicate Minerals	Nov. 2
Mineralogy II: Crystal Chemistry of Silicate Minerals and Glass/Melt Structures	Nov. 2
Paleontology I: Evolution and Extinction	Oct. 31
Paleontology II: Paleocology and Taphonomy	Nov. 3
Paleontology III: Growth, Morphology, Systematics, and Biostratigraphy	Nov. 3
Precambrian Geology I	Nov. 1

Precambrian Geology II	Nov. 3
Quaternary I	Oct. 31
Quaternary II	Oct. 31
Sedimentary Petrology I	Nov. 1
Sedimentary Petrology II	Nov. 2
Sedimentology I	Nov. 1
Sedimentology II	Nov. 2
Sedimentology III	Nov. 3
Stratigraphy	Nov. 1
Structure I: Polyphase Deformation, Mylonites, and Shear Zones	Oct. 31
Structure II: Fold and Thrust Belts	Nov. 1
Structure III: Brittle Deformation and Brittle-Ductile Transitions	Nov. 2
Structure IV: Finite Strain, Ductile Deformation, and Pressure Solution	Nov. 3
Tectonics I: Northern Cordilleran	Oct. 31
Tectonics II: Latin America, North Atlantic	Nov. 1
Tectonics III: Appalachian, Caledonian	Nov. 2
Tectonics IV: Circum-Pacific, Tethyan	Nov. 3
Volcanology	Nov. 3

POSTER PRESENTATIONS

POSTER SESSION I	Oct. 31
Paleontology	Sedimentology/Petrology
Planetary & Remote Sensing	Structural Geology
Sedimentology	
POSTER SESSION II	Oct. 31
Engineering Geology	Geoscience Information
Environmental Geology	Marine Geology
General Geology	Micropaleontology
POSTER SESSION III	Nov. 1
IGCP	Stratigraphy
Precambrian	Tectonics
POSTER SESSION IV	Nov. 1
Geochemistry (High Temperature)	Petrology
Geophysics	Volcanology
Hydrogeology	
Mineralogy	
POSTER SESSION V	Nov. 2
Coal Geology	Oceanography
Geomorphology	Quaternary
POSTER SESSION VI	Nov. 2
Economic Geology	
Geochemistry (Low Temperature)	

TECHNICAL PROGRAM SCHEDULE — 1983

SUNDAY OCT. 30	MONDAY OCT. 31	TUESDAY NOV. 1	WEDNESDAY NOV. 2	THURSDAY NOV. 3
<p>8:00 a.m. — 12 noon</p> <p>Symposia: (23) 10th Symp on Geochemical Cycles</p>	<p>8:00 — 11:30 a.m.</p> <p>Symposia: (2) Coal (6) Hydro/SEG (Centennial Symp) (10) Cushman</p> <p>Technical Sessions: Engineering/History Gen'l Geol I GIS Igneous I Met Pet I Quaternary I Tectonics I</p> <p>Posters: Paleo, Planetary, Sed, Sed Pet, Structure</p> <p>11:45 — 12:15 GSA Presidential Address</p> <p>GSA AWARDS</p> <p>2:00 — 6:00 p.m.</p>	<p>8:00 a.m. — 12 noon</p> <p>Symposia: (8) Quat & Geomorph (22) Fluid Flow</p> <p>Technical Sessions: Economic I Gen'l Geol II Igneous III Marine I Micropaleo Sediment I Structure II</p> <p>Posters: IGCP, Precambrian, Stratigraphy, Tectonics</p>	<p>8:00 a.m. — 12 noon</p> <p>Symposia: (13) MSA (14) NAGT (15) Paleo</p> <p>Technical Sessions: Archaeology Economic III Geochem III Hydro I Mineralogy I Sediment II Tectonics III</p> <p>Posters: Coal, Geomorphology, Oceanography, Quaternary</p>	<p>8:00 a.m. — 12 noon</p> <p>Symposia: (9) Struct & Tect (19) Teays-Mahomet Bedrock</p> <p>Technical Sessions: Ex Pet Geochem IV Geology Ed Geophysics/Math Paleo II Precambrian II Sediment III Volcanology</p>
<p>LUNCHEONS:</p> <p>1:00 — 5:00 p.m.</p> <p>Symposia: (20) Ev & Environ Sig of Skeletal Growth (21) Stable Isotope Studies (23) 10th Symp (cont.)</p>	<p>2:00 — 6:00 p.m.</p> <p>Symposia: (5) History (6) Hydro/SEG (cont.) (16) Precambrian of Midwest (17) Deep Ocean Black Shales</p> <p>Technical Sessions: Coal Geochem I Igneous II Paleo I Quaternary II Structure I</p> <p>Posters: Eng, Environ, Gen'l Geol, GIS, Marine, Micropaleo</p>	<p>1:30 — 5:30 p.m.</p> <p>Symposia: (1) Archaeology (3) Engineering (7) Planetary, GS, MSA</p> <p>Technical Sessions: Economic II Geochem II Marine II Precambrian I Sed/Pet I Strat Tectonics II</p> <p>Posters: Geochem, Geophysics, Hydro, Mineralogy, Petrology, Volcanology</p>	<p>1:30 — 5:30 p.m.</p> <p>Symposia: (4) Geophysics (11) Geochemical (12) GIS (15) Paleo (cont.) (18) Mesozoic Magmatism</p> <p>Technical Sessions: Environmental Geomorph I Mineralogy II Sed/Pet II Structure III</p> <p>Posters: Economic, Geochemical</p>	<p>1:00 — 5:00 p.m.</p> <p>Technical Sessions: Economic IV Geochem V Geomorph II Hydro II Met Pet II Paleo III Structure IV Tectonics IV</p>
<p>6:00 — 9:00 p.m. Exhibits Open Welcoming Party</p>	<p>6:00 — 9:00 p.m. Alumni Receptions</p>	<p>6:00 — 10:00 p.m. Night at the Market</p>		

MORNING SESSIONS

AFTERNOON SESSIONS

Year	Month	Day	Time	Location	Activity	Remarks
1950	Jan	1	8:00 AM	Home	Wrote letter to Mother	Letter sent by mail
1950	Jan	5	10:00 AM	Home	Wrote letter to Father	Letter sent by mail
1950	Jan	10	9:00 AM	Home	Wrote letter to Sister	Letter sent by mail
1950	Jan	15	8:30 AM	Home	Wrote letter to Brother	Letter sent by mail
1950	Jan	20	9:00 AM	Home	Wrote letter to Grandmother	Letter sent by mail
1950	Jan	25	8:00 AM	Home	Wrote letter to Grandfather	Letter sent by mail
1950	Jan	30	9:00 AM	Home	Wrote letter to Aunt	Letter sent by mail
1950	Jan	31	8:00 AM	Home	Wrote letter to Uncle	Letter sent by mail
1950	Feb	1	9:00 AM	Home	Wrote letter to Cousin	Letter sent by mail
1950	Feb	5	8:30 AM	Home	Wrote letter to Niece	Letter sent by mail
1950	Feb	10	9:00 AM	Home	Wrote letter to Nephew	Letter sent by mail
1950	Feb	15	8:00 AM	Home	Wrote letter to Mother-in-law	Letter sent by mail
1950	Feb	20	9:00 AM	Home	Wrote letter to Father-in-law	Letter sent by mail
1950	Feb	25	8:30 AM	Home	Wrote letter to Sister-in-law	Letter sent by mail
1950	Feb	30	9:00 AM	Home	Wrote letter to Brother-in-law	Letter sent by mail
1950	Mar	1	8:00 AM	Home	Wrote letter to Cousin-in-law	Letter sent by mail
1950	Mar	5	9:00 AM	Home	Wrote letter to Niece-in-law	Letter sent by mail
1950	Mar	10	8:30 AM	Home	Wrote letter to Nephew-in-law	Letter sent by mail
1950	Mar	15	9:00 AM	Home	Wrote letter to Mother-in-law	Letter sent by mail
1950	Mar	20	8:00 AM	Home	Wrote letter to Father-in-law	Letter sent by mail
1950	Mar	25	9:00 AM	Home	Wrote letter to Sister-in-law	Letter sent by mail
1950	Mar	30	8:30 AM	Home	Wrote letter to Brother-in-law	Letter sent by mail
1950	Mar	31	9:00 AM	Home	Wrote letter to Cousin-in-law	Letter sent by mail

Continued on next page

Exhibits & Social Events

GSA Geoscience Exhibition

The Welcoming Reception will be held in the Exhibit Hall on Sunday evening, Oct. 30, 6–9 p.m., as the opening of the Geoscience Exhibition. Both food and beverages will be available. During this evening, exhibitors will display measurement equipment, X-ray diffraction and other instruments, photographic equipment, spectrometers, microscopes, microanalysis equipment, publications, maps, and rock objets d'art.

After Sunday evening, the exhibit will be open daily, Monday and Tuesday, 10 a.m.–6 p.m. and on Wednesday, 10 a.m.–4 p.m. The exhibit is the central gathering place during the meeting. Enjoy morning coffee and a light lunch daily.

As of press time, the 1983 exhibitors are:

AAPG Bookstore
AAPG — Visiting Geologists Program
Academic Press, Inc.
Allen & Unwin, Inc.
American Geological Institute
American Geophysical Union
American Institute of Professional Geologists
University of Arkansas/Monticello
Bausch & Lomb, Inc.
Blake Industries, Inc.
William C. Brown Company Publishers
Buehler Ltd.
Burgess Publishing Company
Cambridge Press
Cameca Instruments, Inc.
Circum-Pacific Map Project
Cushman Foundation
Dapple Systems
Economic Geology Publishing Company
Elsevier Science Publishing Company, Inc.
Enraf-Nonius Service, Corp.
Finnigan MAT
Forestry Suppliers, Inc.
W. H. Freeman & Co.
General Supply Corp.
Geologic Times
Geoscience Information Society
Geoscience Resources, Inc.
GSA Bookstore

GSA Combined Publishers Display
GSA 1984 Annual Meeting—Reno
High Pressure Diamond Optics, Inc.
Hillquist
Hunter Textbooks, Inc.
Hutchinson Ross Publishing Co.
International Association for Mathematical Geology
International Human Resources Development Corp.
International Union of Geological Sciences IUPUI, Indiana and Purdue Universities, and Indiana Geological Survey
Kendall/Hunt Publishing Co.
Kevex Corporation
Krueger Enterprises, Inc.
E. Leitz, Inc.
Logitech, Inc.
McGraw-Hill Book Co.
The Ben Meadows Co.
Memorial University of Newfoundland
Charles E. Merrill Co.
Mineralogical Society of America
Minerals Management Service
National Association of Geology Teachers
National Science Foundation
Nature's Own
Nicolet XRD
Nikon, Inc., Instrument Division
Nuclide Corporation

Olympus Corporation of America
Oxford University Press
Paleontological Society
Pergamon Press, Inc.
Philips Electronic Instruments, Inc.
Plenum Publishing Corp.
Prentice Hall, Inc.
Princeton University Press
Rigaku/USA, Inc.
Schonsted Instrument Co.
Scientific and Medical Publications—France, Inc.
Siemens-Allis Corp.
Sigma Gamma Epsilon
Society of Economic Geologists
Society of Economic Paleontologists & Mineralogists
Spectrex Corporation
Springer-Verlag New York, Inc.
Touchstones
United States Geological Survey
VG Instruments, Inc.
Vickers Instruments, Inc.
Western Michigan University
Wildlife Supply Company
John Wiley & Sons, Inc.
Williams & Heintz Map Corp.
Carl Zeiss, Inc.

Welcoming Party

Sun., Oct. 30, Convention Center, 6–9 p.m.

This reception offers a good central place to renew friendships, to make plans, and to share ideas. The reception is in the Ballroom and the Exhibit Hall, where food and beverages will be available. Badges are not required; however, for convenience, registration for the meeting will continue until 7:30 p.m.



INDIANAPOLIS

SOCIAL EVENTS (con't)

GSA AWARDS LUNCHEON

Mon., Oct. 31, Hyatt Regency, 12:30–2:00 p.m.

New for '83 and new for GSA The Awards Luncheon will honor the Penrose and Day Medalists as well as the Society's 96th year of support for the science of geology. A tasty, moderate menu and light beverages are the background for this welcoming ceremony for all geologists and their guests.

Everyone is invited to the luncheon, which is being hosted, in part, by the Society. This will be the only official luncheon held on Monday and is available by preregistration **only** for a \$10 fee.

Our gifted toastmaster will be Richard Hutchinson, consultant to Chevron Resources Company and current president of the Society of Economic Geologists. He'll delight us with his wit as well as keep the protocol for honoring Day Medalist Harmon Craig and Penrose Medalist Gustav Cooper.

The luncheon will be preceded by the GSA Presidential Address. President Paul Bailly's topic is "Geologists and GNP: Future Prospects." The address will be held in the Convention Center, separately from the luncheon. Everyone is welcome.

ALUMNI NIGHT

Mon., Oct. 31, Hyatt Regency, 6–9 p.m.

Alumni colleagues have a chance to get together immediately following the Monday technical sessions. More than 50 colleges and universities have scheduled receptions. If you want to be sure your alumni group is included, call the GSA Meetings Department in Boulder, (303) 447-2020.

A NIGHT AT THE MARKET

Tues., Nov. 1, 6–10 p.m.

Indianapolis has special attractions not usually known to outsiders—before their first visit. With this night of food and music, you'll find out just how enjoyable Indianapolis can be.

Three of the area's finest groups will play different kinds of music for both listening and dancing. Simultaneous sounds, but located in three separate areas of the Indianapolis City Market.



A fusion jazz group has earned its reputation for excellent jazz in the Wes Montgomery tradition and plays a combination of rock and jazz that *moves*.

From the hills of Kentucky and the farms of the midwest, another group, direct from the National Bean Blossom Bluegrass Festival, plays in the bluegrass genre.

And for those in a quieter mood, there's a chamber group with musicians from the highly ranked Indianapolis Symphony.

The City Market is on the National Historic Register but is the very updated gathering place for the Indianapolis downtown crowd. GSA has reserved the Market for Tuesday, November 1, from 6 to 10 p.m. so that we can enjoy it as much as the locals.

The Market has an almost endless number of food stands, serving—deli style—a full range of tastes, including Mexican, French, Italian, Chinese, Indo-Chinese, and standard American fare.

When the music heats up and the food starts to settle, free beer and wine are available for everyone. The wine grapes are grown in southern Indiana and the vintner (Easley Wineries) is eager to show geologists what a good limestone terrain offers.

It's the place to be on Tuesday night!

Fee: \$12.00

GSA ICE HOCKEY GAME

Tues., Nov. 1, there will be a GSA pick-up, no slap-shot, no checking, ice hockey game. Game time is 10:15 p.m. to 12:15 a.m. at the Carmel Ice Skadium, Indianapolis. You are required to bring your own helmet. Limited equipment available on rental basis (skates, sticks). There will be a nominal fee for participation. You need not be of NHL calibre—fun and friends is the name of the game. For further information and sign-up, contact: Rudy Slingerland, Department of Geosciences, 303 Deike Building, Pennsylvania State University, University Park, PA 16802, (814) 865-6892.



INDIANAPOLIS

Guest Program & Employment Interviews

Registration as a guest is necessary for participation in the Guest Program. Guest registration includes admission to the Hospitality Room, all social events, and the exhibits. (Registration as a professional is required for admission to the technical sessions.)

The Hospitality Room is in the Hyatt Regency. Hours are noon—4:30 p.m. Sunday, and 9:00 a.m.—4:00 p.m. Monday through Thursday. Light refreshments and a place to

relax will be provided to those registered as guests; please wear your badge. Each registered guest who visits the Hospitality Room will receive a free gift, and each will be eligible to win a door prize. Hosts and hostesses will be on hand to share pleasantries or to help you if you are in need.

The Local Committee warmly welcomes you to Indianapolis and hopes that you will enjoy your visit.

Guest Tours

1. City Tour—Indianapolis Motor Speedway Museum— Mon., Oct. 31, 9:00 a.m.—noon. Repeated Wed., Nov. 2, 2:00—5:00 p.m.

From the Hyatt Regency departure point to the Indianapolis Motor Speedway Museum, you will see some of the outstanding attractions and landmarks in Indianapolis, including the Soldiers and Sailors Monument, Christ Church, Scottish Rite Cathedral, the Indiana University—Purdue University campus, Clowes Memorial Hall, Benjamin Harrison's home, the Oldfield Estate, and more.

On display in the east wing of the Speedway's Hall of Fame building are dozens of famous race cars, including 21 Indianapolis "500" winners. The west wing is devoted to a display of classic and antique passenger cars. For a small fee buses are available for a ride around the track if it is not in use for test purposes. Cost: \$8.00.

2. Shopping at Keystone-at-the-Crossing— Mon., Oct. 31, 2:00—4:30 p.m. and 3:15—5:30 p.m., Tues., Nov. 1, 1:30—4:30 p.m. and 2:30—5:30 p.m., Thurs., Nov. 3, 9:00 a.m.—noon.

This shopping center on the northern periphery of Indianapolis offers a most unusual blend of the old and the new. The Bazaar is a maze of many different specialty and antique shops and small restaurants. The Fashion Mall is a group of clothing shops that specialize in fashionable wear; two fine restaurants are located among the shops. Cost: \$4.00.

3. Tour of Columbus—Indiana Architecture— Mon., Oct. 31, 1:30—5:00 p.m.

Columbus, about 35 miles south of Indianapolis, is nationally renowned for its unique examples of architectural originality and creativity. The city is a veritable museum of 20th-century architecture. Among the outstanding architects whose works can be seen are Eliel and Eero Saarinen, I. M. Pei, Harry Weese, Robert Venturi, and Skidmore, Owens & Merrill. Columbus is aptly known as the "Athens of the Plains." Cost: \$15.00.

4. Harrison Home and Indianapolis Museum of Art— Tues., Nov. 1, 9:00 a.m.—1:30 p.m.

This elegant Victorian home in near-downtown Indianapolis belonged to Benjamin Harrison, the 23rd President of the United States. Many mementos help provide an understanding of the man who was instrumental in early efforts to conserve our natural resources through a national park system.

The Museum of Art is located on 150 acres along the eastern side of the White River in the northern part of Indianapolis. The Museum offers a permanent collection of European and American paintings and sculpture, decorative arts, graphics, ceramics, silver, and African, Oceanic, and Oriental art. Also on display are the Clowes Collection of Old Masters, the J.M.W. Turner Collection, and furniture, porcelain, and textile exhibits. Cost (including lunch in the Garden-on-the-Green Restaurant): \$17.00.

5. Children's Museum— Tues., Nov. 1, 1:30—4:30 p.m. and 2:30—5:30 p.m.

As its motto says, "The Children's Museum is a unique experience for everyone who is or ever was a child!" The largest children's museum in the world, its collections contain more than 75,000 objects in the areas of history, ethnology, paleontology, geology, natural history, and archaeology. The collections of toys, coverlets, firefighting equipment, and African and American Indian materials are especially noteworthy. The geology and paleontology displays and exhibits are excellent. Cost: \$4.00.

6. Connor Prairie Pioneer Settlement— Wed., Nov. 2, 9:00 a.m.—1:00 p.m.

Located on 250 acres about 20 miles northeast of Indianapolis, the Settlement is an open-air museum of a central Indiana village of 1836. The re-creation of the village includes 25 historical buildings, where costumed men and women portray the occupations, chores, and everyday lives of the early settlers. By participating with the role-playing interpreters, visitors will experience life in frontier America in 1836. Cost: \$13.00.

Employment Interviews

Organizations seeking qualified earth scientists to fill staff needs and persons seeking employment in the earth-sciences fields are invited to participate in the GSA Employment Interview Service. The Employment Interview Service will be conducted in the Indiana Convention-Exposition Center.

All interested organizations are urged to submit notices of their vacancies (suitable for posting) and requests for computer listings of applicants. The minimum fee for a printout of two specialty listings is \$120. Interview booths may be rented in half-day increments during the meeting (Monday through Wednesday) at a nominal fee. GSA staff will handle all interview scheduling with Employment Service applicants. Request forms are in the March and July issues of *GSA News & Information*, sent to all GSA members, or may be obtained by contacting the Membership Department, P.O. Box 9140, Boulder, CO 80301.

Job-seeking participants who have attended past annual meetings

have found the Employment Interview Service very helpful in their search for positions. The applicant fee is \$20 for GSA Members and Student Associates in good standing and \$40 for nonmembers for a one-year registration, including the interview service at the annual meeting. Employment Service forms are in the March and July issues of *GSA News & Information* or may be obtained by contacting Clara Hodgson, Membership Coordinator, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020.

Note to Applicants: Completed application forms, a one-page resume, and your \$20 or \$40 payment must be received at GSA headquarters no later than August 22, 1983, in order for your record to be included on the computer printouts sent to the employers prior to the meeting. **Get the maximum exposure by getting your forms in early, and don't forget to indicate whether you are attending the meeting for interviewing purposes!**

Important Information

1. Registration is required for all attendees, including all field trip participants and guests.
2. A member discount applies to any professional member of GSA or Associated Society. The Associated Societies that qualify are listed on the registration form. Professional nonmember registrants who apply for GSA membership by November 30, 1983, will be entitled to a \$25 reduction in the 1984 membership fee. **The meeting registration form must be attached to the membership application** in order to receive the reduction. Membership applications are available from headquarters or during the meeting in the Convention Center at the GSA Bookstore, the GSA Employment Service, or the Information Desk.
3. Student IDs are required to obtain student rates at both the on-site and the preregistration counters.
4. Full payment **must** accompany registration. Unpaid purchase orders are not accepted as valid registration.
5. Register one professional or student per form.
6. Your check will be your receipt. Copy the form for your records.

Refunds

GSA will refund advance registration fees for all cancellations received in writing by October 7, 1983. **No refunds will be made on cancellation notices received after October 7.** Refunds will be mailed from GSA after the meeting. All refunds will be subject to a \$10 processing fee.

Registration Schedule— Indiana Convention Center

Friday, October 28	8:00 a.m. to 11:30 a.m.*
Saturday, October 29	8:00 a.m. to 3:00 p.m.*
Sunday, October 30	10:00 a.m. to 7:30 p.m.
Monday, October 31	7:30 a.m. to 5:00 p.m.
Tuesday, November 1	7:30 a.m. to 5:00 p.m.
Wednesday, November 2	7:30 a.m. to 2:00 p.m.
Thursday, November 3	7:30 a.m. to 2:00 p.m.

*At field trip desk for **ONLY** those previously registered.

Registration Fees

	Advance	On-Site	One-Day (Available on-site only)
Professional- Member	\$70	\$ 80	\$40
Professional- Nonmember	\$95	\$105	\$53
Student	\$35	\$ 40	\$20
Guest	\$25	\$ 35	N/A

Abstracts with Programs

Purchase of *Abstracts with Programs* is available three ways:

1. **Advance Mailing:** If you have not ordered *Abstracts with Programs* already, but wish to receive a copy for home delivery before October 21, complete order form below and mail to reach GSA by September 23. **Price: \$6.00.**
2. **Reserved On-Site.** Order by filling out "Abstracts" line on Preregistration Form. A copy will be waiting for you at the Annual Meeting. **Price: \$9.00.**
3. **Open On-Site.** Purchase on-site from a limited quantity available. **Price: \$9.00.**

USE THIS FORM ONLY WHEN ORDERING **ADVANCE MAILING** COPIES OF *ABSTRACTS WITH PROGRAMS* — 1983
Order from: GSA Publication Sales, P.O. Box 9140, Boulder, CO 80301

Ship _____ advance copies of *Abstracts with Programs* — 1983

Enclosed check/money order in U.S. funds in the amount of \$ _____ *

Charge to MasterCard/VISA (circle one). Account # _____ Expiration Date _____

Name _____

Address _____ Apt. _____

State/Country _____ ZIP _____

* Colorado residents add sales tax.

Preregistration

Preregistration Deadline: Must be received by September 30. Send full payment.
 Cancellation Deadline: Requests to be made in writing and received by October 7. No refunds after this date.

TYPE OR PRINT • COPY FOR YOUR RECORDS

Name _____ (first) _____ (last) _____ (nickname for badge)

Mailing Address _____

City _____ State _____ Zip _____ Country _____

Institution/Employer _____

Business Phone (_____) Home Phone (_____)

PREREGISTRATION FEES:

	Fee	No.	Amount
Professional member (please circle all affiliations)			
GSA [1] GIS [2] GS [3] MSA [4] NAGT [5] PS [6] SEG [7] CF [8]	\$70	1	\$ _____
Professional nonmember	\$95	1	_____
Student (ID required for badge pickup)	\$35	1	_____

Guest (fee does not include admission to technical sessions)

For Guest Name _____

Badge Only City _____ State _____ (4)

GUEST ACTIVITIES (guest registration fee is required)

City Tour, Motor Speedway	Oct. 31	(5)	\$ 8	_____	_____
Keystone-at-the-Crossing (✓ one)	2:00 ____ (6) 3:15 ____ (7)	Oct. 31	\$ 4	_____	_____
Columbus Architecture	Oct. 31	(8)	\$15	_____	_____
Harrison Home Luncheon	Nov. 1	(9)	\$17	_____	_____
Children's Museum (✓ one)	1:30 ____ (10) 2:30 ____ (11)	Nov. 1	\$ 4	_____	_____
Keystone-at-the-Crossing * (✓ one)	1:30 ____ (12) 2:30 ____ (13)	Nov. 1	\$ 4	_____	_____
Connor Prairie Pioneer Settlement	Nov. 2	(14)	\$13	_____	_____
City Tour, Motor Speedway *	Nov. 2	(15)	\$ 8	_____	_____
Keystone-at-the-Crossing *	Nov. 3	(16)	\$ 4	_____	_____

*Repeated

SPECIAL EVENTS (registration is required)

GSA Awards Luncheon	Oct. 31	(17)	\$10	_____	_____
A Night at the Market	Nov. 1	(18)	\$12	_____	_____
Engineering Geology Division Luncheon	Nov. 1	(19)	\$12	_____	_____
Geoscience Information Society Luncheon	Nov. 1	(20)	\$12	_____	_____
History of Geology Division Luncheon	Nov. 1	(21)	\$12	_____	_____
Hydrogeology Division Luncheon	Nov. 1	(22)	\$12	_____	_____
Mineralogical Society Luncheon	Nov. 1	(23)	\$12	_____	_____
National Association of Geology Teachers Luncheon	Nov. 1	(24)	\$12	_____	_____
Paleontological Society Luncheon	Nov. 1	(25)	\$12	_____	_____
Planetary Geology Division Luncheon	Nov. 1	(26)	\$12	_____	_____
Association of Women Geoscientists Luncheon	Nov. 2	(27)	\$12	_____	_____
Coal Geology Division Luncheon	Nov. 2	(28)	\$12	_____	_____
Geophysics Division Luncheon	Nov. 2	(29)	\$12	_____	_____
Quaternary Geology & Geomorphology Division Luncheon	Nov. 2	(30)	\$12	_____	_____
Society of Economic Geologists Luncheon	Nov. 2	(31)	\$12	_____	_____

Abstracts with Programs (reserved on-site)	(32)	\$ 9	_____	_____
			TOTAL	_____

FOR OFFICE USE ONLY

Balance Due \$ _____ A/R

Deposit Date _____

Refund \$ _____ A/P

Check No. _____

U.S. FUNDS ONLY • CHARGE OR REMIT CHECK TO: 1983 ANNUAL MEETING

MASTER CARD

VISA Exp. Date / /

Signature _____

MAIL TO: GSA, 1983 ANNUAL MEETING, P.O. BOX 9140, BOULDER, CO 80301



96th Annual Meeting
October 31~November 3, 1983
Preregistration Deadline:
September 30, 1983



INDIANAPOLIS



**THE
GEOLOGICAL SOCIETY
OF AMERICA**
P.O. Box 9140 • 3300 Penrose Place
Boulder, Colorado 80301

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