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San Antonio

1986
ANNUAL MEETING
AND EXPOSITION

November 10–13, 1986
San Antonio Convention Center
San Antonio, Texas



THE GEOLOGICAL SOCIETY OF AMERICA

For further information contact: GSA, P.O. Box 9140, Boulder, CO 80301 (303) 447-2020



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**1986
ANNUAL MEETING
LOCAL
COMMITTEE**

General Chairman	James O. Jones	University of Texas at San Antonio
Co-Chairman	Melvin C. Schroeder	Texas A&M University
Field Trip Chairman	Edmund G. Wermund, Jr.	University of Texas at Austin
Co-Chairman	Weldon W. Hammond, Jr.	University of Texas at San Antonio
Foreign Visitors Chairman	Alan P. Morris	University of Texas at San Antonio
Guest Program Chairman	Marilyn Jones	
Science Theater Chairman	David J. Fitzgerald	St. Mary's University
Special Events Chairman	Donald R. Lewis	University of Texas at San Antonio
Technical Program Chairman	John C. Maxwell	University of Texas at Austin
Co-Chairman	Eric R. Swanson	University of Texas at San Antonio
Technical Services Chairman	Stuart Birnbaum	University of Texas at San Antonio
Transportation Chairman	Berry Sutherland	University of Texas at San Antonio

**APPRECIATION
FROM GSA**

The Geological Society of America is grateful to and sincerely thanks all those who have contributed so much to the success of this meeting: the speakers for their contributions to the science; exhibitors for their financial support, products, and information; the local committee for its leadership; the associated societies for their programs and patience; and you geoscientists for your attendance and ongoing support of the Society. To each and every one, a special thanks from GSA's Council and staff.

WELCOME

You are invited to San Antonio, a city of rich Mexican heritage and many gifts of nature. San Antonio is a major center for geologists, a place of history and tradition, a city carefully planned with excellent convention facilities and entertainment within easy walking distance.

The meeting is hosted by faculty from the University of Texas at San Antonio and at

Austin; Texas A&M, and St. Mary's universities; the Bureau of Economic Geology; and other local geologists and friends.

The field trips, technical program, and other events have been designed to bring you the best in the geosciences. In addition to the regular program of volunteered and invited papers, we expect to have special poster displays of new data from COCORP, the Ocean Deep Sea Drilling Project (ODP), the University of Texas

Institute of Geophysics, and recently completed transects from the Decade of North American Geology (DNAG) project. The newest information from the Voyager encounter with Uranus will also be presented, and a number of internationally recognized geoscientists will be discussing their most recent work.

TECHNICAL PROGRAM/SYMPOSIA

The technical program consists of volunteered papers that are presented in oral or poster session and invited papers presented in symposia. The symposia list appears below.

- 1. Surveying and Prospecting for Archaeological Sites.** Archaeological Geology Division; John Gifford, University of Miami.
- 2. Advances in Coal Characterization.** Coal Geology Division; Jesse Yeakel, Exxon Production Research Company.
- 3. Engineering Geology in Public Policy.** Engineering Geology Division and GSA Committee on Geology and Public Policy; Christopher Matthewson, Texas A&M and John S. Scott, Geological Survey of Canada.
- 4. Tectonics and Geophysics of the Western Himalayas.** Geophysics Division and Structural Geology and Tectonics Division; Lawrence Malinconico, Southern Illinois University and Robert Lillie, Oregon State University.
- 5. Nineteenth-Century Geological Exploration in the Western Gulf Region.** History of Geology Division; Thomas Dutro, Jr., U.S. National Museum.
- 6. Hydrogeology of Sedimentary Basins.** Hydrogeology Division; Charles Kreitler, Texas Bureau of Economic Geology.
- 7. Mars—Ten Years After Viking.** Planetary Geology Division; Arden Albee, California Institute of Technology.
- 8. Quaternary Evolution of the Mississippi Valley.** Quaternary Geology and Geomorphology Division; James Knox, University of Wisconsin.
- 9. Tide- versus Storm-Dominated Shelves: Their Modern and Ancient Oceanographic Settings and Deposits.** Sedimentary Geology Division; Rudy Slingerland, Pennsylvania State University.
- 10. Microbial Contributions and Transformations in the Sedimentary Record.** Geochemical Society; Robert Gagosian, Woods Hole Oceanographic Institution.
- 11. The User and Geoscience Information.** Geoscience Information Society; Robert Bier, Lakewood, Colorado.
- 12. Crystal-Liquid Reactions in Granites and Migmatites.** Mineralogical Society of America; Richard Abbott, Appalachian State University.
- 13. Recent Advances in Hydrogeology: Implications for Instruction.** National Association of Geology Teachers; Bernard Pipkin, University of Southern California.
- 14. Ontogeny and Heterochrony in the Fossil Record.** Paleontological Society; Michael McKinney, University of Tennessee.
- 15. Precious Metals in Skarns and Limestone-Hosted Intrusion-Related Ore Deposits.** Society of Economic Geologists; Joaquin Ruiz, University of Arizona.
- 16. Timing and Depositional History of Eustatic Sequences: Constraints on Seismic Stratigraphy.** Cushman Foundation; Charles Ross, Chevron USA.
- 17. Scientific Advances in Geology and Hydrology from Studies of Contaminant Plumes.** Keros Cartwright, Illinois State Geological Survey.
- 18. High Pore-Fluid Pressures in Active Tectonic Areas.** John Bredehoeft, USGS, Menlo Park.
- 19. Terranes in the Circum-Atlantic Paleozoic Orogens.** David Dallmeyer, University of Georgia.
- 20. New Perspectives on the Old Rocks in Northeastern Mexico.** Thomas H. Anderson, University of Pittsburgh.
- 21. Sequence Stratigraphy.** Ashton Embry, Geological Survey of Canada.
- 22. Late Cenozoic Evolution of Stream Systems in the Western United States.** Peter C. Patton, Wesleyan University.
- 23. The Southern Margin of the North American Craton: Late Proterozoic to Permian.** M. Charles Gilbert, Texas A&M University.
- 24. North American Continent-Ocean Transects Program—Atlantic, Arctic, Gulf Transects.** DNAG; Robert C. Speed, Northwestern University.
- 25. Evolution of the Rio Grande Rift and the Geochemistry of Related Magmatism.** Geochemical Society; E. Craig Simmons, Colorado School of Mines.
- 26. Restricted Basin Ore Deposits.** Society of Economic Geologists; Gregory E. McKelvey, Cominco American, Inc.
- 27. Recent Concepts and Quantitative Methods Applied to Carbonate Aquifers.** Robert W. Maclay, USGS, San Antonio.
- 28. The Precambrian Framework of the Caribbean and Gulf of Mexico.** Allan K. Gibbs, Cornell University.



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2. Advances in Coal Characterization	Nov. 10
3. Engineering Geology in Public Policy—Parts I & II	Nov. 10
4. Tectonics and Geophysics of the Western Himalayas—Parts I & II	Nov. 11
5. Nineteenth-Century Geological Exploration in the Western Gulf Region	Nov. 11
6. Hydrogeology of Sedimentary Basins	Nov. 10
7. Mars—Ten Years After Viking	Nov. 11
8. Quaternary Evolution of the Mississippi Valley	Nov. 11
9. Tide- Versus Storm-Dominated Shelves: Their Modern and Ancient Oceanographic Settings and Deposits	Nov. 10
10. Microbial Contributions and Transformations in the Sedimentary Record—Parts I & II	Nov. 9
11. The User and Geoscience Information	Nov. 10
12. Crystal-Liquid Reactions in Granites and Migmatites	Nov. 10
13. Recent Advances in Hydrogeology: Implications for Instruction	Nov. 12
14. Ontogeny and Heterochrony in the Fossil Record	Nov. 11
15. Precious Metals in Skarns and Limestone-Hosted Intrusion-Related Ore Deposits	Nov. 11
16. Timing and Depositional History of Eustatic Sequences: Constraints on Seismic Stratigraphy	Nov. 12
17. Scientific Advances in Geology and Hydrology from Studies of Contaminant Plumes	Nov. 13
18. High Pore-Fluid Pressures in Active Tectonic Areas	Nov. 10
19. Terranes in the Circum-Atlantic Paleozoic Orogens	Nov. 12
20. New Perspectives on the Old Rocks in Northeastern Mexico	Nov. 13
21. Sequence Stratigraphy	Nov. 12
22. Late Cenozoic Evolution of Stream Systems in the Western United States	Nov. 12
23. The Southern Margin of the North American Craton: Late Proterozoic to Permian	Nov. 10
24. North American Continent-Ocean Transects Program—Atlantic, Arctic, Gulf Transects	Nov. 10
25. Evolution of the Rio Grande Rift and the Geochemistry of Related Magmatism	Nov. 12
26. Mineralization in Restricted Basins	Nov. 9
27. Recent Concepts and Quantitative Methods Applied to Carbonate Aquifers	Nov. 9
28. The Precambrian Framework of the Caribbean	

VOLUNTEERED SESSIONS

Archaeology	Nov. 12
Coal Geology	Nov. 11
Cretaceous/Tertiary Boundary	Nov. 12
Economic Geology I	Nov. 10
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Economic Geology III	Nov. 12
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Experimental Petrology	Nov. 11
Geochemistry I	Nov. 10
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Geochemistry V	Nov. 13
Geochemistry VI	Nov. 13
Geology Education	Nov. 13
Geomorphology	Nov. 12
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Igneous Petrology I	Nov. 11
Igneous Petrology II	Nov. 13
Igneous Petrology III	Nov. 11
Marine Geology I	Nov. 13
Marine Geology II	Nov. 12
Metamorphic Petrology I	Nov. 12
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Micropaleontology	Nov. 13
Mineralogy/Crystallography	Nov. 12
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Quaternary Geology I	Nov. 13
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Remote Sensing	Nov. 10
Sedimentary Petrology I	Nov. 12
Sedimentary Petrology II	Nov. 13
Sedimentology I	Nov. 11
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Stratigraphy	Nov. 10
Structural Geology I	Nov. 10
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Structural Geology III	Nov. 13
Structural Geology IV	Nov. 13
Tectonics I	Nov. 10

POSTER SESSION

COCORP, DNAG, ODP—Special Posters Displays Daily.	
Poster Session I	Nov. 10
Geochemistry, Geoscience Information, Marine Geology, Micropaleontology, Oceanography, Paleontology	
Poster Session II	Nov. 10
History of Geology, Hydrogeology, Sedimentary Petrology, Sedimentology	
Poster Session III	Nov. 11
Economic Geology, Geomorphology, Glacial Geology, Quaternary Geology	
Poster Session IV	Nov. 11
Engineering and Environmental Geology, Planetary Geology, Precambrian Geology, Remote Sensing, Stratigraphy	
Poster Session V	Nov. 12
Coal Geology, Geophysics, North American Ocean Transects, Petroleum Geology	
Poster Session VI	Nov. 12
Archaeology, Structural Geology, Tectonics	
Poster Session VII	Nov. 13
Experimental Petrology, Igneous Petrology, Metamorphic Petrology, Mineralogy/Crystallography, Volcanology	
Poster Session VIII	Nov. 13
General Geology, Geology Education	

TECHNICAL PROGRAM SCHEDULE — 1986

= SYMPOSIA IDENTIFICATION UPPER/LOWER CASE = VOLUNTEERED SESSIONS ALL CAPS = POSTER SESSIONS

SUNDAY NOV. 9	MONDAY NOV. 10	TUESDAY NOV. 11	WEDNESDAY NOV. 12	THURSDAY NOV. 13
8:30 am-12:00 noon * #10 Geochem #26 SEG	8:00 am-12:00 noon * # 2 Coal # 3 Eng./Publ Policy # 6 Hydrogeology # 9 Sedimentology #23 S. Margin Econ Geol I Geochem I Ign Pet I Struct I Tect I	8:00 am-12:00 noon * # 4 Struct/Geophys # 5 History # 7 Planetary #14 Paleontology Eng & Environ Exp Pet Geochem II Precamb Sedimentol I Struct II	8:00 am-12:00 noon * #13 NAGT #19 Circum-Atlantic #22 Evol. Western #25 Geochem-Rio Geochem IV Hist/Arch Met Pet I Min./Cryst Paleo II Tect IV	8:00 am-12:00 noon * #17 Contam. Plumes #20 NE Mexico Econ Geol IV Geochem V Micropaleo Petroleum/Sed Pet II Quat I Struct III Tect V Volcan
	# 5 Eng./Publ Policy # 6 Hydrogeology # 9 Sedimentology #23 S. Margin Econ Geol I Geochem I Ign Pet I Struct I Tect I	# 4 Struct/Geophys # 5 History # 7 Planetary #14 Paleontology Eng & Environ Exp Pet Geochem II Precamb Sedimentol I Struct II	#13 NAGT #19 Circum-Atlantic #22 Evol. Western #25 Geochem-Rio Geochem IV Hist/Arch Met Pet I Min./Cryst Paleo II Tect IV	#17 Contam. Plumes #20 NE Mexico Econ Geol IV Geochem V Micropaleo Petroleum/Sed Pet II Quat I Struct III Tect V Volcan
	GEOCHEM, GIS, MARINE, MICROP, OCEAN, PALEO	ECONOMIC, GEOMORPH, GLACIAL, QUAT	COAL, GEOPHYS, OCEAN TRANSECTS, PETROLEUM	EX PET, IGN PET, MET PET, MIN/CRYST, VOLCAN
LUNCHEONS:				
1:00-5:00 p.m. * #27 Carbon Aquifers #28 PreC Framework	1:00-5:00 p.m. * # 3 Eng./Publ Policy #11 GIS #12 MSA #18 High Pore-Fluid #24 DNAG: Transects Econ Geol II Paleo I Remote Sensing/ Planet Strat Tect II	1:30-5:30 p.m. * # 1 Archaeology # 4 Struct/Geophys # 8 Quaternary #15 SEG/Skarns Coal Geochem III Ign Pet II Marine I/Ocean Sedimentol II Tect III ENG/ENV, PLANET, PRECAMB, REMOTE, STRAT	1:30-5:30 p.m. * #16 Cushman #21 Sequence Strat Econ Geol III Geomorph Geophys/Marine II Hydro I K/T Boundary Met Pet II Paleo III Sed Pet I ARCH, STRUCTURE, TECTONICS	1:00-5:00 p.m. * Geochem VI Geol Ed/GIS Hydro II Ign Pet III Quat II Struct IV Tect VI GENERAL, GEOL ED

* ROOM KEY: A = Theater (1600) E = Centro (646) H = Fiesta D (303)
 B = South Banquet (1600) F = Plaza (534) J = Fiesta E (303)
 C = Mission (770) G = Fiesta AB (303) K = Fiesta C (252)
 D = River (620)

FIELD TRIPS

San Antonio, Texas, via varied transportation means, offers ready access to diverse and unique geologic exposures in Texas and adjacent states. Trans-Pecos calderas and structure, Ouachita Mountains tectonics, Wichita Mountains stratigraphy and intrusives, High Plains morphology, Pennsylvanian cycles, Edwards limestone aquifer systems, Llano granites of the craton, salt domes, lignite resources, and coastal processes on barrier islands offer great diversity.

All trips originate and end in San Antonio, unless otherwise specified. Participants must provide their own transportation to the starting point and from the termination point, for those trips not originating or terminating in San Antonio. Trips are technical in nature and can be physically rigorous.

Trip costs include transportation for the trip itself and guidebook. It also may include costs of other services as noted by the following symbols: M—Meals; A—Airfare; ON—Overnight lodging. **FOR SOME PREMEETING TRIPS, GROUP RATE AIRFARES HAVE BEEN ARRANGED TO GET PARTICIPANTS TO SAN ANTONIO AT THE TERMINATION OF THE FIELD TRIP. IF YOU DO NOT WISH TO TAKE ADVANTAGE OF THIS AIR TRAVEL, PLEASE REGISTER USING THE FEE LISTED WITHOUT AIRFARE FOR THAT TRIP.**

REGISTRATION. Field trip registrants are required to be registered for the meeting. If you do not plan to attend the meeting, but do plan to participate in a field trip, you may register using the one-day registration fee. This will entitle you to a one-day badge for the day of your choice. Registration fee cannot be refunded or transferred.

PREREGISTRATION DEADLINE: must be RECEIVED at GSA Headquarters no later than October 10, 1986. Preregistration is suggested because participants are selected on a first-come, first-served basis.

Registration form and procedures are provided in this announcement. Registration for field trips after the deadline may be possible if trip logistics and space permit; contact Kathy Ohmie, Field Trip Coordinator, GSA Headquarters. On-site registration MAY be possible during the meeting at the Field Trip Desk, Convention Center, for postmeeting field trips.

CANCELLATION DEADLINE IS OCTOBER 17. No refunds will be given for cancellations received after this date. If GSA must cancel a field trip because of logistics or registration requirements, a full refund will be issued to trip registrants as soon as possible after the meeting.

GUIDEBOOKS may be purchased at the field trip desk during the meeting. After the meeting, contact E. G. Wermund, Bureau of Economic Geology, University of Texas, Austin, TX 78713 for information on ordering guidebooks.

For further trip information, contact Field Trip Chairman E. G. Wermund, Bureau of Economic Geology, University of Texas, Austin, TX 78713, (512)471-1534; Field Trip Co-Chairman Weldon Hammond, Div. Earth & Physical Sciences, University of Texas, San Antonio, TX 78285, (512)691-4455; Field Trip Coordinator Kathy Ohmie, GSA Headquarters; or the designated field trip leaders.

PREMEETING TRIPS

1. *Quaternary Geology and Geomorphology of the Rolling Plains, Texas Panhandle—*

Thomas C. Gustavson, Robert W. Baumgardner, Jr., Chris Caran, and Edward Collins, Bureau of Economic Geology, University of Texas, Austin, TX 78713 (512/471-1534); Walter Dalquest, Midwestern State University, Wichita Falls, Texas. Two and one-half days, Nov. 7–9.

Evidence for interpretations of geomorphic processes and Quaternary history in parts of the Rolling Plains of the Texas Panhandle will be described. Particular attention will be paid to the dissolution of evaporites, primarily salt, and collapse of overlying strata as a process that has had a significant effect on landscape development and Quaternary stratigraphy in this area. A preliminary discussion of newly recognized Quaternary deposits covering several hundreds of square miles will be presented. Trip originates at Lubbock, Texas, airport, 5:00 p.m., Nov. 7. The trip will be of interest to Quaternary geologists, geomorphologists, archaeologists, paleontologists, and anyone concerned with regional paleoclimate.

Cost: \$235; includes 2 ON, 2 M, A—Lubbock to San Antonio; \$155 without airfare. Limit 45.

2. *Archaeological Geology of Classic Paleoindian Sites on the Southern High Plains, Texas and New Mexico—*Vance T. Holliday, Department of Geography, University of Wisconsin, Madison, WI, 53706 (608/262-6300); Eileen Johnson, The Museum, Texas Tech University, Lubbock; Vance Haynes, University of Arizona, Tucson; Glen Evans, Austin, Tex; Dennis Stanford, Smithsonian Institution, Washington, D.C. Two and one-half days, Nov. 7–9.

The field trip will focus on the historical significance of the Lubbock Lake Plainview, and Clovis (Blackwater Draw Locality #1) sites, the Paleoindian archaeology and geochronology, and the late Quaternary environmental records as related to the entire region. One other late Quaternary stratigraphic sequence in lower Blackwater Draw, near Lubbock Lake, may also be viewed. The trip should be of interest to archaeological geologists and Quaternary geologists and also those interested in the history of geology and, perhaps, vertebrate paleontology. Trip originates in Lubbock, Texas.

Cost: \$235; includes 2 ON, 2 M, A—Lubbock to San Antonio; \$155 without airfare. Limit 45.

3. *Igneous Geology of Trans-Pecos Texas—*

Jonathan G. Price and Christopher D. Henry, Bureau of Economic Geology, University of Texas, Austin, TX 78713 (512/471-1534); Don F. Parker, Baylor University, Waco, Texas; Daniel S. Barker, University of Texas, Austin. Three and one-half days, Nov. 6–9.

The field trip will examine caldera structures, field relations of pyroclastic rock rheology of peralkaline ash-flow tuffs and lava flows, magma mixing within intrusion and petrogenesis of silica-unsaturated and silica-saturated magmas. The Trans-Pecos region is an igneous province with some of the best exposures of alkalic rocks and calderas in the world. Highlights of the first full day of the field trip will be the Marble Canyon stock, an unusual alkalic intrusion that is zoned from a nepheline-bearing alkali-gabbro rim to a quartz-syenite core, and the Van Horn Mountains caldera, where

many classic caldera structures are well exposed. Highlights of the second day will be exposures of peralkaline ash-flow tuffs, which exhibit spectacular secondary flow features, inside and outside the Buckhorn caldera and exposures of alkalic rocks on the Paisano volcano in the Davis Mountains

area. On the return to San Antonio on the last day, the trip will focus on pyroclastic rocks of the Pine Canyon caldera in Big Bend National Park. Trip originates in El Paso, airport, 5:00 p.m., Nov. 6.

Cost: \$250; includes 3 ON, 5 M.
Limit 45.

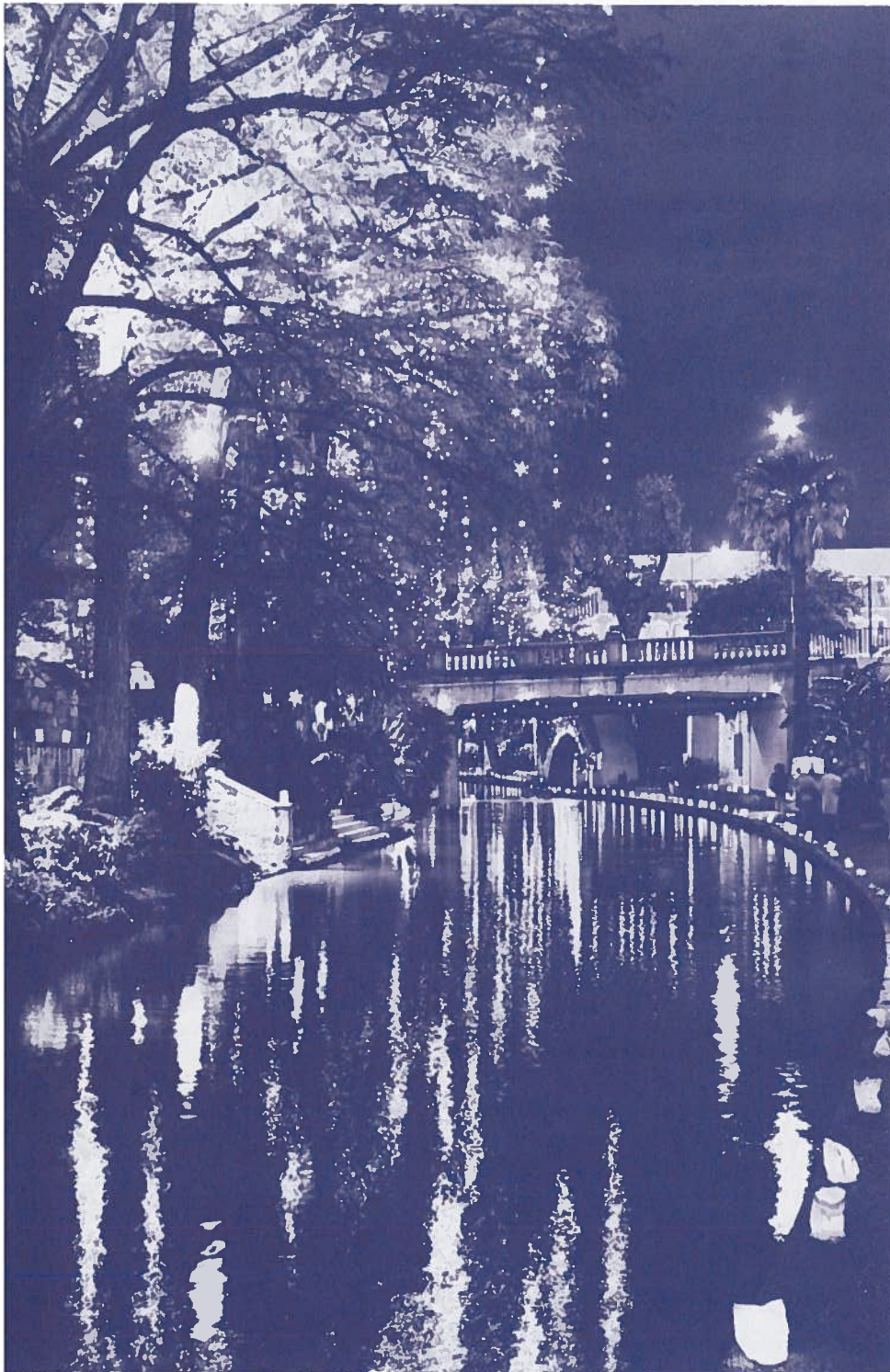
4. Ouachita Mountain Geology—Structure, Stratigraphy, Depositional and Thermal History, Arkansas—Charles G. Stone, Arkansas Geological Commission, Little Rock, AR 72204 (501/371-1488); Boyd R. Haley, Little Rock. Three and one-half days, Nov. 6–9.

The trip examines the rather complex folded and thrust-faulted Paleozoic sedimentary rocks in the east-central core and adjoining areas of the Ouachita Mountains, Arkansas, and attempts to demonstrate the apparent deep-water depositional environments and the likely sediment sources of the Lower Ordovician Collier Shale through the Middle Pennsylvanian Atoka Formation; the major thrust faults, including the Alum Fork and other decollements; the respective stages, styles, and intensities of deformation in several of the structural belts (Hooper, Mount Ida, Avilla, Aly, etc.); and the effects of episodes of late Paleozoic thermal activity and, locally, later overprinting by Cretaceous intrusives on these rocks. There will be rather lengthy discussion of the several published and other proposed tectonic models for the formation of the rocks in the fold belt; the oil and gas potential, including maturation and possible levels of degradation; and the probable exhalative base metal and other mineral occurrences. Trip originates in Little Rock, Arkansas.

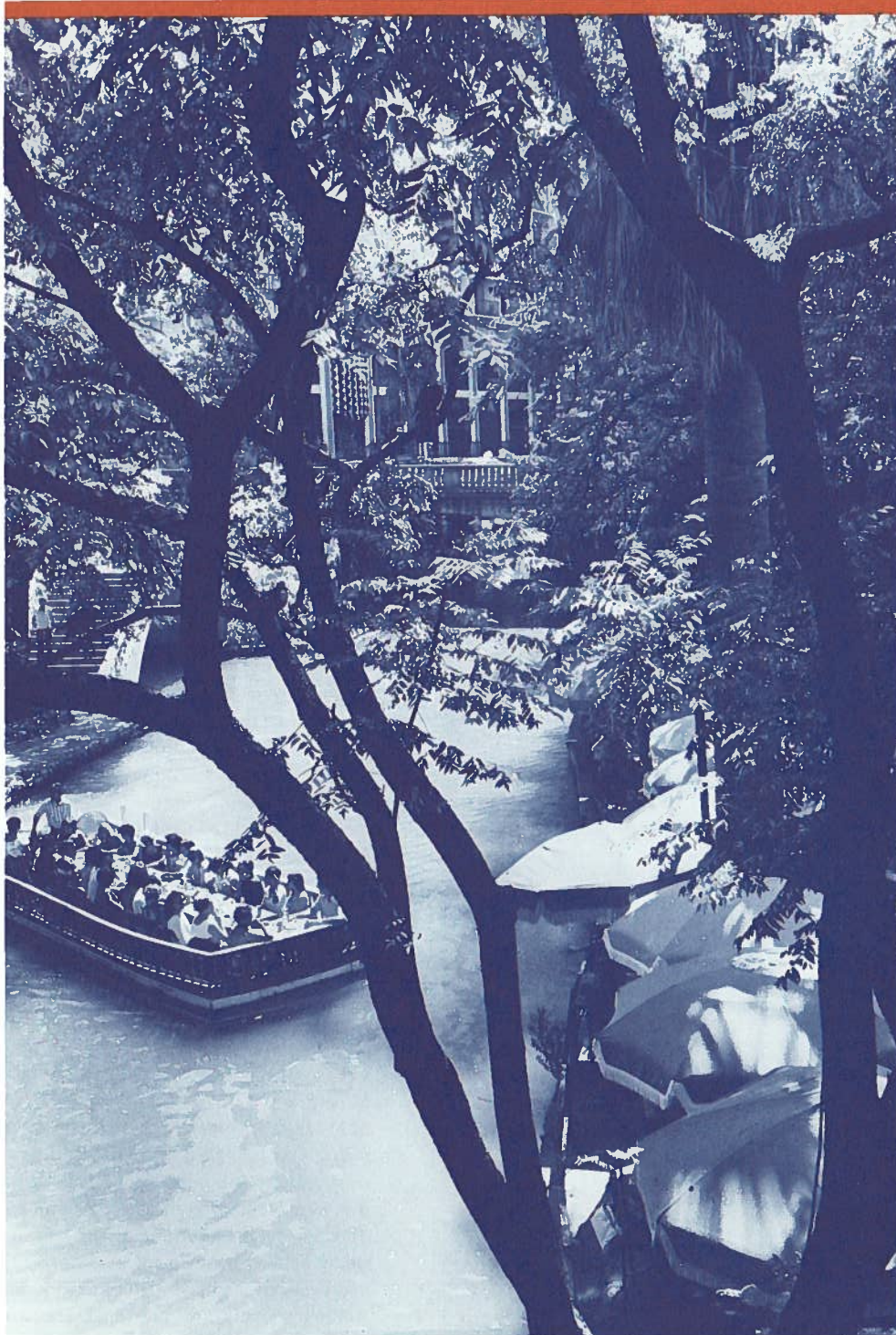
Cost: \$315; includes 3 ON, 3 M, A—Little Rock to San Antonio; \$236 without airfare. Limit 45.

5. Engineering Geology of San Antonio, Texas—Jeffrey R. Walker and Edward G. Miller, Raba-Kistner Consultants, P.O. Box 32217, San Antonio, TX 78216 (512/699-9090). One day, Nov. 9.

This trip will provide a general overview of the effect of geology on urban development in San Antonio. The general stratigraphy, structural geology, hydrogeology, and physiography of the San Antonio region will be presented. The two distinct geotechnical environments in the area—the Tertiary sands and expansive clay formations of southern San Antonio and the Cretaceous limestones and marls of northern San Antonio—will be examined. The geology and geotechnical engineering of several large construction projects will be



San Antonio



inspected, with particular emphasis on the engineering geology and geotechnical aspects of construction on the Balcones fault zone and with the Edwards Group Limestone.

Cost: \$45; includes 1 M. Limit 45.

6. Stratigraphy and Structure of the Maverick Basin and Devil's River Trend, Lower Cretaceous, Southwest Texas—C. I. Smith, Department of Geology, University of Texas, Arlington, TX 76019 (817/273-2987); Peter R. Rose, Telegraph Exploration, Telegraph, Texas; Bruce C. Miller, Exxon Company USA, Corpus

Christi, Texas; R. E. Webster, Dallas; C. H. Humphreys, Ensearch Exploration, Dallas. Three days, Nov. 7–9.

The purpose of this trip is to describe, interpret, examine, and provoke discussion on (1) the stratigraphic and facies relationships of the Lower Cretaceous Fredericksburg–lower Washita (Albian) strata between the Maverick Basin and the Devil's River trend formations of the southern Edwards Plateau, (2) surface structural patterns and their relationship to Paleozoic (Ouachita) structural and tectonic trends, and (3) the hydrocarbon potential of the Lower Cretaceous sequence in the Maverick Basin. The field trip will focus not only on clarifying the genetic stratigraphic relationships but also on examination of Cretaceous structure, including the relationship between Cretaceous and Paleozoic structures.

Cost: \$265; includes 2 ON, 3 M. Limit 45.

7. Petrology of the Cambrian Wichita Mountains Igneous Suite—M. C. Gilbert, Department of Geology, Texas A&M University, College Station, TX 77843 (409/845-2451); B. N. Powell, Phillips Petroleum, Bartlesville, Oklahoma; R. Cooper, Lamar University, Beaumont, Texas. Three days, Nov. 7–9.

This trip will begin with examination of the Meers fault, the largest surface-breaking fault scarp east of the Rocky Mountains. The trip will familiarize participants with the layered mafic intrusion and/or A-type sheet granites and magma mixing associated with the Southern Oklahoma aulacogen. The aulacogen extends approximately 450 km from southeastern Oklahoma into the midcontinent, where it forms a WNW-trending swath across crystalline basement rocks with ages of 1.3–1.4 Ga. Characteristics and differences of the igneous rocks will be demonstrated, including bimodal chemistry, major gabbroic units (one a layered cumulate complex), and assemblage of granitic sheets of A-type chemistry, a series of rhyolites including both ash-flow tuffs and thick flows, and a set of diabase dikes. Trip originates in Lawton, Oklahoma.

Cost: \$326; includes 2 ON, 4 M, A—Lawton to San Antonio; \$235 without airfare. Limit 45.

8. *Hydrology of the Edwards Aquifer, San Antonio Region, Texas*—Weldon W. Hammond, Jr., Geology Program, Earth and Physical Sciences, University of Texas, San Antonio, TX 78285 (512/691-4455); Diane Pavlicek, USGS, San Antonio; George Ozuna and Glenn Longley, Southwest Texas State University, San Marcos. One day, Nov. 8.

The Edwards Limestone contains one of the most highly permeable and productive carbonate aquifers in the United States. San Antonio is the largest city in the United States to be supplied entirely by ground water. This field trip will present evidence relating to regional differences in porosity development and the geologic controls on porosity development and as such will concentrate on the hydrogeologic characteristics of the aquifer. The trip will examine local recharge areas, faults, well fields, and springs. Emphasis will be placed on research relating to the fresh water-saline water interface and its relation to hydrostratigraphic controls and hydrodynamic responses within the aquifer.

Cost: \$55; includes 1 M. Limit 45.

9. *Paleoenvironments and Fossil Communities of the Late Pennsylvanian of North-Central Texas*—Thomas E. Yancey, Texas A&M University, College Station, TX 77843 (409/845-0643); Steve Schutter, Exxon Production Research Company, Houston. One and one-half days, Nov. 7-8.

This trip will examine paleontologic communities and transgressive-regressive sequences, cyclic stratigraphy, of the late Pennsylvanian Eastern Shelf. Upper Strawn Group, Canyon Group, and lower Cisco Group outcrops, approximately late Desmoinesian, Missourian, and early Virgilian age, will be visited. A transgressive fauna in carbonate-dominated systems can be compared to a regressive fauna of predominantly delta-related sediments. Comparisons with classic midcontinent faunas are possible. Trip originates at the Dallas-Fort Worth airport, 5:00 p.m., Nov. 7.

Cost: \$140; includes 1 ON, 1 M. Limit 45.

10. *Geology of Gulf Coast Lignites*—Walter Ayers, Texas Bureau of Economic Geology, University of Texas, Austin, TX 78712 (512/471-1534); John Breyer, Texas Christian University, Fort Worth; John

Johnston, Louisiana Geological Survey, Baton Rouge; Robert Finkelman, Houston, (713/497-0425). Three and one-half days, Nov. 6-9.

The major focus of this trip is an evaluation of the evidence used in interpreting the depositional environments of the Gulf Coast lignites. Sections will be examined at five active lignite mines in Louisiana and Texas. Four mines are in the Wilcox Group; the fifth is in the Jackson Group. In addition, there will be discussions on coal quality trends, mining methods, geochemistry, petrography, and environmental aspects of lignite mining. Trip originates in Shreveport, Louisiana.

Cost: \$265; includes 3 ON, 3 M. Limit 45.

11. *Geology and Mineral Resources of Gulf Coast Salt Domes*—Steven Seni, Bureau of Economic Geology, University of Texas, Austin, TX 78713 (512/471-1534); Fairis Samuelson, Texasgulf Chemicals Co., Newgulf, Texas; and Peter Price, Marathon Oil Co., Littleton, Colorado. One day, Nov. 9.

A resurgence of interest in salt domes and their cap rocks has been fueled by expanded use of domes for product storage such as the Strategic Petroleum Reserve and by proposed use of salt domes for nuclear and toxic-chemical waste disposal and for compressed air storage. Recent exploration has discovered Zn-Pb-Ag deposits in Gulf Coast cap rocks, and research indicates a genetic link between these cap-rock deposits and several classic ore deposit types in sedimentary terranes. Two salt domes on the Texas Coastal Plain provide a convenient and appropriate starting point for comparing mechanisms and timing of dome and cap-rock evolution and natural resource distribution. Sites to be visited include the cap rock limestone quarry at the Damon Mound and the Frasch sulfur operation at Boling dome. General features of calcite and anhydrite cap rocks will be examined in cores from Hockley and Boling domes, including sulfur and Pb-Zn-Ag sulfide mineralization.

Cost: \$70; includes 1 M. Limit 45.



San Antonio

12. *Sedimentation in and Deformation of the Southern Oklahoma Aulacogen*—R. N. Donovan and T. Boone Pickens, Jr., School of Geology, Oklahoma State University, Stillwater, OK 74078 (405/624-6358). Three days, Nov. 7–9.

In the vicinity of the Wichita Mountains, the field trip will address the themes: (1) the basal transgression of the Upper Cambrian across an irregular land surface carved from volcanic rock; (2) the passage from a siliciclastic to a carbonate-dominated sedimentation pattern; (3) shallow carbonate platform sediments including evidence for vanished evaporites; (4) intense structural deformation involving faulting and folding of the lower Paleozoic rocks under the influence of a left-lateral transpressive stress system; (5) the Permian alluvial fan conglomerates derived from an active fault scarp; and (6) the evidence for recent (ca. 10,000 B.P.) movement of the Meers fault. Trip originates in Lawton, Oklahoma.

Cost: \$326; includes 2 ON, 4 M, A—Lawton to San Antonio; \$235 without airfare. Limit 45.

POSTMEETING TRIPS

13. *Precambrian Granite Magmatism and Diapirism, Llano Uplift, Central Texas*—Volker W. Gobel, Department of Geology, Stephen F. Austin State University, Nacogdoches, TX 75962 (409/569-3701); Robert M. Hutchinson, Golden, Colorado. Two days, Nov. 14–15.

The trip will familiarize participants with the granite magmatic phase of the Llano orogenic basement rocks in central Texas and examine petrology, internal zoning, granite tectonics, and intrusion patterns as displayed by selected plutons. Characteristics and differences of the three-phase granitic cycles in the Llano Uplift region will be demonstrated: Town Mountain-type rapakivi granites and Six Mile-type and Oatman Creek-type granites.

Cost: \$150; includes 1 ON, 1 M. Limit 45.

14. *Geologic and Geomorphic History of the Edwards Limestone Aquifer and Surface Drainage System, South-Central Texas*—Patrick L. Abbott, Department of Geological

Sciences, San Diego State University, San Diego, CA 92182 (619/265-5591); Charles M. Woodruff, Jr., Austin. One day, Nov. 14.

The field trip will view and discuss the integrated geologic and geomorphic development of the Edwards Aquifer and the evolution of the surface drainage basin. View the Edwards Limestone outcrop in the Balcones fault zone between San Antonio and New Braunfels. The main message will be the geologic history of the Edwards Aquifer from the Cretaceous to the present and its interdependency with the surface drainage network. Outcrops to be visited will show the Balcones escarpment, Edwards Limestone depositional environments, discharge sites and major springs, collapsed caverns at mega-collapse localities in karstic plains, evidence for stream piracy, and recharge through stream bottoms and fractures.

Cost: \$60; includes 1 M. Limit 90.

15. *South Texas Modern Depositional Systems*—John L. Russell and Jon A. Baskin, Department of Geosciences, Texas A&I University, Kingsville, TX 78363 (512/595-3310). Three days, Nov. 14–16.

The field trip will examine Holocene depositional systems in Nueces, Kleberg, and Kenedy Counties, Texas. Estuarine, eolian, fluvial, deltaic, lagoonal, and barrier island environments will be investigated. The Nueces Bay–Corpus Christi Bay normal estuarine system will be compared to the Baffin Bay system, which commonly has reverse estuarine circulation. Baffin Bay is unique in the United States because it is commonly hypersaline and contains Holocene carbonate and evaporites. The South Texas Eolian Sand Plain will be examined. Fluvial and bay head delta systems of the Nueces River will be examined as well as lagoonal and barrier island environments on Mustang and North Padre islands.

Cost: \$200; includes 2 ON, 3 M. Limit 45.

16. *Stratigraphy of the El Paso Borderland, Texas*—David V. LeMone, Department of Geological Sciences, University of Texas, El Paso, TX 79968 (915/747-5275). Two and one-half days, Nov. 13–15.

The trip will concentrate on the truly outstanding and magnificently exposed stratigraphic sequence in the El Paso border region. The Franklin Mountains tilted fault

block, Cerro de Cristo Rey, and adjacent bolsons contain exposed Precambrian through Cenozoic stratigraphic sequences. Six Precambrian formations totaling 1,674 m in thickness in the Franklin Mountains will be examined. Cretaceous siliciclastics and carbonate rock sequences at Cerro de Cristo Rey will be examined and related to equivalent units of the Edwards Plateau. Late Cenozoic Fort Hancock and Camp Rice lacustrine-fluvial sequences will be examined. Trip terminates in El Paso.

Cost: \$190; includes 2 ON, 2 M, A—San Antonio to El Paso; \$125 without airfare. Limit 45.

17. *Upper Cretaceous Volcanic Centers of South and Central Texas*—Thomas E. Ewing, Frontera Exploration Services, 900 NE Loop 410, Suite D-303, San Antonio, TX 78209 (512/822-3133); S. Christopher Caran, Bureau of Economic Geology, Austin; L. Joy Hudson, San Antonio. Two days, Nov. 14–15.

In Late Cretaceous time, hundreds of volcanoes erupted on the chalky, open shelf of central and south Texas. Original magmatic compositions were mafic and alkalic, nephelinites being most common, with local phonolites and basalts. Eruptions produced tuff mounds of palagonite tuff and associated mudflows. Fringing reefs and shoal-water carbonates were constructed on the volcanoes' flanks and were deposited on a regional scale in the Uvalde area. This trip will visit the classic Austin exposures of palagonite tuff and overlying "beachrock" and shoal complexes. Distal and proximal tuff facies; mudflows; lagoonal, coral-bearing muds; and subaerial basaltic flows will be visited. Participants will tour the Uvalde area to see fresh exposures of ultramafic and alkaline rocks. The Knippa Quarry exposes a lava-lake complex crosscut by subaerial vent-facies of nephelinite-bearing spinel-peridotite nodules. The trip will finish by examining the asphalt-saturated, shoal-water carbonates of the Anacacho Mountains.

Cost: \$95; includes 2 ON, 2 M. Limit 45.

18. *Platform Comanchean of Central Texas*—O. T. Hayward, Rena Bonem, and Robert Grayson, Department of Geology, Baylor University, Waco, TX 76703 (817/755-2361). Two and one-half days, Nov. 13–15



The field trip will show the platform Comanchean section of central Texas in the type area of its many formations. It will emphasize the Trinity Group fluvial to marine transition, from fluvial conglomerates to carbonate bank deposits, the remarkable uniformity of the Fredericksburg and Washita shallow marine, and the Del Rio Clay unique pyritized dwarf fauna.

Cost: \$150; includes 2 ON, 2 M.
Limit 45.

SEG-SPONSORED FIELD TRIPS

Sediment-Hosted Pb-Zn-Ag-Ba Deposits of the Midcontinent—Richard Hagni, Department of Geology, University of Missouri, Rolla, MO 65401 (314/341-4657); Charles Stone, Arkansas Geological Commission, Little Rock; Tim Master, Consultant, Hot Springs, Arkansas; Heyward Wharton, Missouri Geological Survey, Rolla; Robert Dunn, Paul Gerdemann, and Jay Gregg, St. Joe Minerals Corp., Viburnum, Missouri; and Milton Bradley, Cominco American, Bixby, Missouri. Five days (plus previous evening), Nov. 3–8.

This trip will emphasize depositional and diagenetic environments as applied to origin of and exploration for Paleozoic shale- and carbonate-hosted ore deposits in northern Arkansas and southeastern Missouri. The first part of the trip will examine the Paleozoic siliciclastic strata of the Ouachita region in outcrops and cores taken during exploration for sedimentary exhalative Zn-Pb-Ag deposits. Stratiform barite deposits with associated sulfides will be studied in open-pit exposures. Examine the Late Cambrian shelf carbonates in surface exposures and the associated ore deposits of southeastern Missouri. The group will visit a Viburnum Trend Pb-Zn mine and a Washington County residual barite deposit. Trip originates in Little Rock, Arkansas, the evening of Nov. 3, and ends in St. Louis the afternoon of Nov. 8.

For reservations, forward a \$100 deposit, payable to "Midcontinent Pb-Zn Excursion" by Sept. 1 to Richard Hagni, Department of Geology, University of Missouri, Rolla, MO 65401, (314/341-4657). Balance due by Oct. 1, 1986. Cost: \$325; includes 5 ON, 6 M, and guidebook. 40 participants.

Limestone-Replacement Pb-Zn-Ag Deposits of Northern Mexico—Kenneth Clark, Department of Geological Sciences, University of Texas, El Paso, TX 79912; Joaquin Ruiz and Peter Megaw, Department of Geosciences, University of Arizona, Tucson. Four and one-half days. Nov. 13–17.

Trip departs from San Antonio at noon, Nov. 13 and terminates in El Paso the evening of Nov. 17. The group will fly to Monterrey, Nuevo Leon, and drive to Torreon, Coahuila. On Friday the group will travel to Velardena, Durango, to examine the replacement Pb-Zn-Ag deposits within Cretaceous carbonate strata on the San Maria structural dome. Succeeding days include travel to Chihuahua to examine similar ores distributed in mantos and breccia pipes at Naica and at Santa Eulalia (east and west camps).

For reservations, forward a \$100 deposit payable to "Mexico Excursion, Fall, 1986" by Sept. 1, 1986, to PUBCO, P.O. Box 637, University of Texas, El Paso, TX 79968-0637, (915/533-1965). Balance due by Oct. 1, 1986. Cost: \$375; includes 4 ON, 12 M, guidebook, and airfare to Monterrey from San Antonio. (Price may vary depending on final logistics and fluctuating exchange rates.)

San Antonio

EXHIBITS

Exhibits open at 6:00 p.m. Sunday, November 9, at the Convention Center and remain open throughout the Welcoming Party until 9:00 p.m. Hours Monday and Tuesday will be 9:00 a.m. to 5:00 p.m., and Wednesday, 9:00 a.m. to 2:00 p.m.

Exhibit space MAY still be available at this time. Please contact Kathy Ohmie, Exhibits Coordinator at GSA headquarters.

Exhibitors as we go to press:

AAPG Bookstore
AAPG Visiting Petroleum Geologists Program
Academic Press, Inc.
ADAMAS
Allen & Unwin, Inc.
American Geological Institute
American Geophysical Union
American Institute of Professional Geologists
Association of Engineering Geologists
Bausch & Lomb
Blackwell Scientific Publications
Blake Industries, Inc.
William C. Brown Publishers
Buehler Ltd.
Bujak Davies Group
Bureau of Economic Geology—
University of Texas
Burgess Publishing Company
Bushwalker/Plateau Design
Cambridge University Press
Cameca Instruments, Inc.
Canadian Society of Petroleum Geologists
Carolina Biological Supply Company
Chapman & Hall
Chemex Labs Ltd.
Chemical Abstracts Service
ChemPet Research
Circum-Pacific Council
Circum-Pacific Map Project
Cushman Foundation
Dapple Systems
Daryl Howard, Inc.
Delsi, Inc.
Digital Image, Inc.
Earth Enterprises, Inc.
Earth Observation Satellite Company
Economic Geology Publishing Company

Edax International
E G & G Ortec
Elsevier Science Publishing Company, Inc.
EMTEK
Encyclopaedia Britannica USA
Finnigan MAT
W. H. Freeman & Company
GBL Electronics
General Supply Corporation
Geological Association of Canada
Geologic Times
Geoscience Information Society
Geoscience Resources, Inc.
Gisco Geophysical Instrument Company
GSA Bookstore
GSA Combined Publishers Display
GSA Decade Project—DNAG
GSA Sections
GSA 1987 Annual Meeting—Phoenix
GSA 1986 Annual Meeting:
University of Texas—San Antonio
University of Texas—Austin
Hillquist, Inc.
International Association for
Mathematical Geology
International Union of Geological Sciences
JCPDS
Jena/Distributor Seiler Instrument Company
JEOL USA, Inc.
KDI Electro-Tec Corporation
Kendall/Hunt Publishing Company
Kevex Corporation
Krueger Enterprises, Inc.
E. Leitz, Inc.
Logitech, Inc.
Louisiana State University—Dept. of Geology
Lubrecht & Cramer Ltd.
Ben Meadows Company
Charles E. Merrill Publishing Company
Mineralogical Society of America
National Association of Geology Teachers
National Science Foundation
Nature's Own
New Mexico Bureau of Mines
& Mineral Resources
Nicolet X-Ray Instruments
Nikon, Inc., Instrument Group
Ocean Drilling Project—
Texas A & M University
Oklahoma Geological Survey
Olympus Corporation
Oxford University Press

Paleoceanographic Mapping Project
Paleontological Society
Pennsylvania Geological Survey
Pergamon Press, Inc.
Philips Electronic Instruments
Plenum Publishing Corporation
Prentice-Hall
Princeton University Press
Raiders of Lost Continents
Rice University
Rigaku/USA, Inc.
Rocklabs
RockWare, Inc.
Rocky Mountain Association of Geologists
SEPM
San Antonio Independent School District
Saunders College Publishing
Schonstedt Instrument Company
Scintag, Inc.
Siemens
Sigma Gamma Epsilon
Spectrex Corporation
Spex Industries, Inc.
Springer-Verlag New York, Inc.
Thrustbelt Systems Ltd.
Touchstones
Tracor Northern
University of Arkansas—Monticello
U.S. Geological Survey
Van Nostrand Reinhold Company, Inc.
VG Instruments, Inc.
Washington State University—
Department of Geology
Wildlife Supply Company
John Wiley & Sons
Williams & Heintz Map Company
X-Ray Assay Labs Ltd.

SPECIAL EVENTS

Burros & Burritos

Wednesday, November 12, 7:00 to 11:00 p.m.
La Villita

This is a special entertainment event where everyone is invited to celebrate San Antonio. The flavor of both Texas and Mexico is yours during this special evening of barbecue andacos, country-western and mariachis, cowboys and Spanish dancers. An exclusive western hoe-down and Mexican fiesta will be presented for GSA in La Villita, the famous Mexican village across from the Convention Center in downtown San Antonio.

Your ticket will be a personal visa that will get you across the "border" between Mexico and Texas for all the Mex-Tex food and beverage you can hold. In addition to margaritas, beer, and wine, the Texas side will offer roast beef, chicken drumsticks, and barbecue sausage, and the Mexican side will offer homemade corn tortillas, fajitas, nachos grandes, and pan dulce.

Cloggers, square-dancers, and Mexican bands will provide the background for dancing and singing. Be on hand for President Ernst's "grand" entrance.

Fee: \$28

immediately by the GSA awards ceremonies for the Penrose and Day Medals. President Ernst's address is titled: "Status and Future of the Earth Sciences: How Bad, How Good?" In a provocative address, he will focus on both the negative and the positive, emphasizing ways we can improve. His message is primarily for those in research and academic fields who want to dynamically affect the future.

After his address, President Ernst will present GSA's prestigious awards to 1986 Day Medalist E-an Zen and 1986 Penrose Medalist, Laurence L. Sloss.

All-GSA Awards Reception

Monday, November 10, 6:00 to 7:00 p.m.
Convention Center

A special reception honoring GSA's Penrose and Day Medalists will follow the awards ceremonies. Everyone is invited to meet the medalists and to celebrate in their honor. This one-hour reception will be held in the same ballroom as the alumni receptions, which begin immediately afterward. Every registrant and guest is welcome to attend the awards and reception.

anyone wishing to attend. Check the registration form to determine the dates of each event and to register for tickets. On-site, the annual meeting program will list the locations and times for each event.

SPORTS EVENTS

Invitational Tennis

Sunday, November 9, 9:00 a.m. to 1:00 p.m.
McFarland Tennis Center

Pack your racket and tennis shoes for a light-hearted tournament with good players. Meet at 8:30 a.m. at the Convention Center for departure to the McFarland Tennis Center for a round-robin doubles tournament.

Partners will be drawn Sunday morning. No singles will be played. Entry will be limited to the first 40 persons registering. Awards will be given to the top three players. The fee includes transportation, beverage, balls, and court fees. *This event is by preregistration only.*

If you have questions on Sunday morning, call or visit the GSA Annual Meeting Office either at the Hyatt or the Convention Center anytime after 7:00 a.m.

Fee per person: \$15

San Antonio Stampede: 5K/10K Run

Wednesday, November 12, 7:30 a.m., start
Convention Center

Attention walkers, joggers, runners! Take a mid-week break to participate in the third annual 5K/10K races. November usually provides excellent weather for running in Hemisfair Exhibition Park near the Convention Center. The race will be professionally directed and timed. Water will be provided on the course, and refreshments and prizes will be at the finish line.

Finnigan MAT, Inc., has again graciously agreed to sponsor the race shirts for runners. Racers should select a T-shirt size on the registration form. Additional T-shirts may be purchased on-site. T-shirts and race maps may be picked up in the registration area beginning on Sunday, November 9.

Fee including T-shirt: \$7



Welcoming Party

Sunday, November 9, 6:00 to 9:00 p.m.
Convention Center

Arrive by riverboat or walk over to the Society's reception to meet your friends and colleagues. This will also be the one opportunity to visit the technical and scientific exhibits unopposed by technical sessions. Registration will be open until 7:30 p.m. for your convenience.

GSA Presidential Address and Awards

Monday, November 10, 5:00 to 6:00 p.m.
Convention Center

Everyone is welcome to attend President Gary Ernst's address, which will be followed

Alumni Night

Monday, November 10, 7:00 to 9:30 p.m.
Convention Center

Alumni receptions begin at 7:00 p.m. simultaneously in the Convention Center and surrounding hotels. More than 50 alumni groups participate. If your university plans to hold an alumni reception, please notify the Events Coordinator at GSA by September 15.

Awards Luncheons and Other Ticketed Meal Functions

Associated societies and GSA divisions hold annual catered events. These events are used to honor medalists and to address important issues related to each group. The events are open to

PROFESSIONAL HORIZONS

GSA SHORT COURSES

All courses sponsored by GSA will be held in San Antonio immediately before and after the GSA Annual meeting. Receive twice the benefits of attending the GSA meeting by participating in one of GSA's professional instruction programs. The courses are designed for several different professional levels.

ENROLLMENT.

Course participation is open to GSA members and nonmembers. Registration for the Annual Meeting is not required.

PREREGISTRATION DEADLINE IS OCTOBER 10.

On-site registration is based on availability. The on-site fee will be \$15 additional.

CANCELLATION.

Fees will be refunded if we are notified by October 17. Substitutions may be made at any time. No refunds will be made after the course is completed. For more information, contact: Course Registrar, GSA Headquarters.

Computer Graphics for Geological Applications

Saturday, November 8, and Sunday, November 9, 8:00 a.m. to 5:00 p.m., Hewlett Packard

This course is designed for those familiar with personal computers, for those who have used a mainframe, or for those with a need to use specialized graphic techniques to help solve geologic problems. The objective will be to provide the participant with an understanding of techniques for creating computer graphics to illustrate geologic information.

Faculty: *Richard G. Craig*, Department of Geology, Kent State University; Ph.D., Pennsylvania State University. Since joining the staff at Kent State in 1978, Craig has transformed a virtually noncomputer department into one of considerable strength in computer use. Well known in the field of computer graphics, Craig is listed in Marquis's *Who's Who in Frontier Science and Technology*. *Harlan P. Foote*, Battelle Memorial Institute, Pacific Northwest Labs. A specialist in the fields of computer graphics, remote sensing, and pattern recognition, Foote has worked for Battelle-Northwest since 1966. Most recently, Foote was selected by NASA as a Principal Investigator on the Landsat 4 project. *Barry L. Roberts*, M.S., Department of Geology, Kent State University. *Michael P. Singer*, URS Dalton, Cleveland; M.S., Department of Geology, Kent State University. Computer equipment provided courtesy of Hewlett-Packard. Travel arrangements for Foote provided by Battelle.

Fee includes course manual, lunch both days, and dinner Saturday evening. Limit: 24. Fee: \$270.

Glacial-Marine Sedimentation

Saturday, November 8, 1:00 to 6:00 p.m., continues 7:30 to 10:00 p.m.; Sunday, November 9, 8:00 a.m. to 5:00 p.m., Hilton Hotel

Intended for a broad spectrum of participants ranging from student to professional this course will present an up-to-date summary of what is known about glacial-marine sedimentation. Emphasis will be on the diverse nature of modern depositional environments and their resulting facies and deposits. Other discussions will analyze the temporal and spatial distribution of glacial-marine sediment in the rock record. The course will also include introductory sections that provide basic information about marine and glacial depositional environments. Hands-on core and seismic profile workshops will enhance the presentation. An informal reception will be held in conjunction with the workshop on Saturday evening.

Faculty: *Bruce F. Molnia*, Polar Research Board, National Research Council, National Academy of Sciences; Ph.D., University of South Carolina. Chief Scientist on more than a dozen research cruises, Molnia's main areas of investigation include the Gulf of Alaska, the



ering Sea, the North Atlantic Ocean, Alaskan
ords, and Antarctica. *John B. Anderson*,
Department of Geology, Rice University; Ph.D.,
lorida State University. Well known in the field
f glaciomarine geology of Antarctic regions,
Anderson is the author of *Sedimentation on the
Antarctic Continental Slope* and recipient of the
L. Herrick Fellowship in Paleontology.

Fee includes course manual and Saturday
evening reception. Limit: 100. Fee: \$100.

Contaminant Hydrogeology

Saturday, November 8, and Sunday,
November 9, 8:30 a.m. to 4:30 p.m.,
Convention Center

This course will provide an introduction to
the theory and practice of contaminant hydro-
geology. It will be of interest to working
professionals and graduate students who want
to develop a basic understanding of this field.
The course will include an examination of
— fundamental concepts of physical mass
transport, advection, dispersion, and
diffusion,
— the most important geochemical processes
that influence the spread of contaminants,
including surface reactions, complexation,
and mineral precipitation, and
— the mathematical formulation and solution
of mass transport equations with an
emphasis on approaches and concepts
rather than detailed mathematics.

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

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

Fee includes course manual. Limit: 85.
Fee: \$100.

Seawater Chronostratigraphy Using Strontium Isotopes

Sunday, November 9, 1:00 to 5:00 p.m.,
Convention Center

Designed for upper-division undergraduates,
graduate students, and professionals in the
geosciences, this one-half day course will cover
the theoretical basis and analytical methodology
behind the application of the Sr isotopic
evolution of seawater to the correlation and
chronology of sedimentary marine carbonate
sequences. Specific applications of the Sr isotopic
chronostratigraphic method will be used to
demonstrate the effectiveness and limitations of
the technique. These include correlation of the
Monterey Formation between coastal southern
California basins, studies of brine migration, oil-
source rock correlations, and paleoenvironmental
analysis of uranium ore deposits in the San Juan
Basin, New Mexico.

Faculty: *Richard W. Hurst*, Department of
Geology, California State University; Ph.D.,
University of California, Los Angeles. Recently
elected to the New York Academy of Sciences,
Hurst has over ten years experience in the fields
of isotope and trace element geochemistry,
petrology, and environmental geochemistry and
biogeochemistry. *Terry E. Davis*, Department of
Geology, California State University; Ph.D.,
University of California, Santa Barbara.
A consultant in geology and geochemistry since
1957, Davis is the author of more than fifty
publications.

Fee includes course manual. Limit: 100.
Fee: \$50.

An Introduction to the Geologic Use of Microcomputers

Sunday, November 9, 8:00 a.m. to
5:00 p.m., Marriott Hotel

Choosing the right hardware and software
for use by today's geologists can be both time-
consuming and expensive. Designed to shortcut
your search, this course will provide an overview
of comparable software and microcomputers
available for purchase and how to apply this
software for both geological and other practical
uses. The course will cover geological data
management, analysis, display, and
communication. It also will cover the use of
word processing in the preparation, editing, and
revision of reports and manuscripts.

Faculty: *Peter G. Sutterlin*, Professor,
Wichita State University; Ph.D., Northwestern
University. Sutterlin was employed with Gulf
Oil of Canada for 10 years and has over 20
years experience in the field of computer

applications for the geologist. *Daniel F. Merriam*,
Distinguished Endowment Professor of Natural
Science, Wichita State University; Ph.D.,
University of Kansas, D.Sc., University of
Leicester, England. Merriam is well known in
the fields of geology and computers and is the
author of *Computer Applications in Geology* and
more than 155 articles. *Mark A. Sondergard*,
B.S., Computer Science, Wichita State
University.

Fee includes course manual and lunch.
Limit: 60. Fee: \$85.

Geologic Applications of Fossil Radiolaria

Sunday, November 9, 8:00 a.m. to
5:00 p.m., Hyatt Regency Hotel

This course is designed for academic and
industry paleontologists as well as field-oriented
geologists working on both onshore and offshore
marine sedimentary rocks. The primary objective
of the course is to demonstrate the geologic
utility of fossil radiolarians. Topics will include
discussions on the major Paleozoic, Mesozoic,
and Cenozoic radiolarian groups and their
biostratigraphic, paleogeographic, and
paleoecologic importance, as well as the various
approaches to radiolarian collection, acid
extraction, and observation.

Faculty: *Charles D. Blome*, U.S. Geological
Survey, Paleontology and Stratigraphy Branch,
Denver; Ph.D., University of Texas at Dallas.
Blome has worked for the U.S. Geological
Survey for the past six years and is well known
for his work in North American radiolarian
biostratigraphy. *Richard M. Casey*, Marine
Studies Program, University of San Diego;
Ph.D., University of Southern California.
Casey has taught for more than 20 years and is a
leading authority in the fields of Cenozoic
radiolarian biostratigraphy and paleoecology.
Patricia Whalen, Geoscience Department,
University of Texas at Dallas; Ph.D., University
of Texas at Dallas.

Fee includes course manual. Limit: 100.
Fee: \$75.

Basic Principles of Rock Mechanics

Friday, November 14, and Saturday,
November 15, 8:30 a.m. to 4:00 p.m.
Texas A&M University, College Station

This course assumes attendees have no prior
knowledge of rock mechanics; it is intended for

San Antonio

geologists who need to either teach or apply this material. The course will cover the basic principles of rock mechanics and their applications, with special emphasis on applications in structural geology and tectonics. During the laboratory time, small groups will see

- an actual experiment, including sample preparation, jacketing, and gauging;
- deformed samples, including thin section; and
- a variety of experimental apparatus.

Organizers: *John H. Spang*, Head, Department of Geology, Texas A&M University; Ph.D., Brown University. *Winthrop D. Means*, State University of New York at Albany; Ph.D., University of California at Berkeley.

Primary faculty: *John Handin*, Ph.D., UCLA. Handin co-authored the classic papers on the effects of confining pressure, temperature, and pore pressure on the deformation of sedimentary rocks. He has served on numerous national and international panels on rock mechanics, waste isolation, and earthquakes. *John Logan*, Ph.D., University of Oklahoma. Logan is working on characterizing the constitutive relations and physical processes of frictional sliding and fault zones through experimental studies and field verification. *Neville Carter*, Ph.D., UCLA. Carter studies flow properties and dislocation-activated processes under mantle conditions and halite under repository conditions. Additional faculty: *Melvin Friedman*, Ph.D., Rice University. *Andreas Kronenberg*, Ph.D., Brown University. Handin, Logan, Carter, Friedman, and Kronenberg are Research Associates at the Center for Tectonophysics and teach in the Department of Geology and/or Geophysics, Texas A&M University, College Station, Texas. The course instructors represent a combined total of more than 100 years experience in the field of industry, university, and government rock mechanics labs.

Fee includes course manual, transportation from San Antonio to College Station on Thursday evening, and an informal dinner on Friday evening. Return transportation to San Antonio will be arranged at an additional fee. Information on lodging in College Station will be sent to registrants. Limit: 60. Fee: \$135.

OTHER COURSES AND WORKSHOPS

Exploration Geochemistry: Design and Interpretation of Soil Surveys

Thursday, November 6 through Sunday, November 9. Quality Inn Hotel. Sponsored by Society of Economic Geologists and Association of Exploration Geochemists.

The course is designed to update practicing exploration geologists on design, implementation, and interpretation of soil geochemical surveys, including choice of appropriate analytical and statistical methods. Case studies will be used to illustrate both the problems that can arise and the benefits of a systematic approach to anomaly definition and rating based on a sound understanding of geochemical processes in surficial media. Instructors will be W. K. Fletcher, S. Hoffman, M. B. Mehrtens, A. J. Sinclair, and I. Thomson.

Fee: \$375, includes double-occupancy lodging, lunches on meeting days, and Volume 3 of *Reviews in Economic Geology*. Enrollment is limited to 60 people on a first-come, first-served basis. Deadline for registration is September 26. For information/registration: Lois Elms, Western Experience, 2369 Carriage Circle, Oceanside, CA 92056; (619) 722-0027.

Stable Isotopes in High-Temperature Geological Processes

Friday, November 7 through Sunday, November 9. El Tropicano Hotel. Registration will be held at an informal welcoming reception at the hotel on Thursday evening, November 6. Sponsored by the Mineralogical Society of America.

A comprehensive overview of the behavior of stable isotopes in the high-temperature environment will be given by 12 well-known specialists. Treatment will include theoretical and experimental aspects of isotopic fractionation (J. R. O'Neil), the kinetics of isotopic exchange (D. R. Cole and H. Ohmoto), isotopic variation in natural waters (S.M.F. Sheppard), isotopic exchange in open and closed fluid/rock systems (R. T. Gregory), the early history of the solar system (R. N. Clayton), isotopic variation in the mantle (T. K. Kyser), isotopic behavior in magmatic fluids (B. E. Taylor), oxygen and hydrogen isotopic studies of igneous rocks (H. P. Taylor and S.M.F. Sheppard), meteoric/ hydrothermal systems (R. E. Criss), submarine hydrothermal systems (K. Muehlenbachs), isotopic behavior during metamorphism (J. W. Valley), and stable isotopes and ore genesis (H. Ohmoto).

Fees: MSA member \$175, MSA student member \$75, nonmember \$210*, nonmember student \$90*. (*Nonmember fees include membership in MSA for 1987.) For information/registration: MSA Business Office, 1625 I Street, N.W., Suite 414, Washington, DC 20006; (202) 775-4344.

Fossil Land Plants

Sunday, November 9, 8:00 a.m. to 5:00 p.m. Hyatt Regency Hotel. Sponsored by the Paleontological Society.

The course will give an overview of the taphonomic constraints involved with the development of terrestrial-plant-bearing lithologies, the paleogeographic distribution of plant communities through time and their bearing on paleoclimatology, the diversity and paleoecology of megafloreal communities in the context of their depositional environment, and their evolution. Participants include William Fritz, Georgia State University; Robert Spicer, Goldsmith's College, London; Robert Gastald, Auburn University; Andrew Knoll, Harvard University; Patricia Gensel, University of North Carolina, Chapel Hill; Steven Scheckler, Virginia Polytechnic Institute; William DiMichele, U.S. National Museum; Gene Mapes, Ohio University; Sergio Archangelsky, Museum of Natural Sciences, Buenos Aires; Sidney Ash, Weber State; Leo Hickey, Peabody Museum; and Jack Wolfe, USGS.

There is no fee. Course notes will be available at a nominal fee. For information: Robert A. Gastald, Department of Geology, Petrie Hall 210, Auburn University, Auburn, 36849-3501; (205) 826-4282.

GeoRef Workshop: Learn to Search the Geological Literature by Computer

Wednesday, November 12, 8:00 a.m. to 12:00 noon. Hilton Hotel. Sponsored by GIS and A

Learn how to begin searching the American Geological Institute's GeoRef online database over a million geological references from 178: the present. The 1986 speakers are: Barbara Pearson, Exxon Production Research Company, Houston; Marilyn Stark, Colorado School of Mines, Golden; and Sharon Tahirkheli, American Geological Institute, Alexandria, Virginia. Beginning and prospective searchers will learn about the GeoRef database and what covers, Boolean logic, online search commands, and how to devise effective search strategies.



sample searches and the resulting geological information will be displayed, and use of the GeoRef Thesaurus and other online search aids will be discussed. General discussion and questions will follow.

There is no preregistration or fee. For information: Kay Yost, AGI, 4220 King Street, Alexandria, VA 22302; (800) 336-4764 outside Virginia, or (703) 379-2480; or Marilyn Stark, Colorado School of Mines, Golden, CO 80401; (303) 273-3687.

GeoRef Trainers Workshop

Thursday, November 13, 8:00 a.m. to 12:00 noon. Hilton Hotel. Sponsored by AGI and GIS.

The purpose of this workshop is to share experience with present and potential workshop trainers on GeoRef. The attendees must be people who are experienced GeoRef database searchers. The scope of the workshop will include discussion of the experience of expert trainers from the GeoRef Information System. Topics to be discussed: Who should be a trainer? What tools are needed for training? What are aims of training? What should be included in a

training session? How long should the session be? The workshop will be conducted by G. N. Rassam and Sharon Tahirkheli of AGI.

There is no preregistration or fee. For information: Kay Yost, AGI, 4220 King Street, Alexandria, VA 22302; (800) 336-4764 outside Virginia, or (703) 379-2480; or Marilyn Stark, Colorado School of Mines, Golden, CO 80401; (303) 273-3687.

San Antonio

FORUMS/PANELS

GSA Employment Service Forum: Future Employment Opportunities in the Geological Sciences

Monday, November 10, 1:00 to 3:00 p.m.,
Convention Center

Are you interested in salary scales, tips for successful interviews, and an overview of employment opportunities? What are the current trends in academia, government, industry, and consulting and the impact of federal legislation on job demand? Attend the GSA Employment Service Forum to hear from seven experts. Each panel member will speak briefly on the outlook in his or her special area and answer questions from the audience. The 1986 speakers are: Chairman Dick Paull, University of Wisconsin; J. D. Edwards, Pecten International Company; Penny Hanshaw, USGS; J. D. Mancuso, Chevron Resources Company; Charlie Mankin, Oklahoma Geological Survey; Dave Stephenson, Dames & Moore; and Steve Stow, Oak Ridge National Laboratory. For further information: Clara Hodgson, Membership Coordinator, GSA headquarters.

Tide- Versus Storm-Dominated Shelves: Their Modern and Ancient Oceanographic Settings and Deposits

Tuesday, November 11, 7:30 to 10:00 p.m.
Hyatt Regency Hotel. Sponsored by the
Sedimentary Geology Division

Rudy Slingerland and William Duke, organizers of the symposium being presented on Monday, November 10, will be the leaders of the panel discussion. This program is intended to emphasize basin-wide sedimentologic relationships; thus, styles of shelf sedimentation will be addressed from a broad-scale, multidisciplinary viewpoint. The panel discussion will open with some outlandish comments by George deV. Klein which may be difficult for some to swallow. In anticipation of this potential problem, soft drinks and beer will be available to be administered as needed!

Special Student Forum

Wednesday, November 12, 5:30 to 7:00 p.m.
Convention Center

The Geological Record of the Causes and
Consequences of Massive Extinctions

Eugene M. Shoemaker, USGS, Flagstaff; Steven
Stanley, Johns Hopkins University

For students only! The first contentious contact forum is a unique program provided to honor GSA's student registrants.

Discussion by two distinguished geologists of their differing interpretations of the geological, geochemical, paleontological, and other sources of evidence for the causes of massive extinctions.

Did the collision of Earth with an object from space result in the extinction of the dinosaurs? What was the source of the thin layer with an unusually high iridium content which occurs at the contact of the Cretaceous and Tertiary? Do massive extinctions occur on a periodic basis?

These questions and others will be debated in an informal setting where student participation will be welcome. **Only those with student badges may attend.**

SCIENCE THEATER

New film series will highlight the 1986 Science Theater. Featured will be the remarkable seven-part Planet Earth series; the 1986 release of six films entitled "Understanding Reefs" filmed off south Florida by Julia Hubbard, King's College, London; and two series on energy from the BBC/British Open University Forum and the Altschul Group. Also shown will be recent films from the Encyclopedia Britannica Corporation including "Geologic Time," produced at the Grand Canyon, "Flood Forecasting," made on location in flood-plain regions, and AAPG's "Arid Carbonate Coastlines," shot on location in the Persian Gulf. A host of other new films related to climate, Great Lakes research, landslides, plate tectonics, and the environment will keep you abreast of the latest developments.

FUTURE ANNUAL MEETING DATES

1987	Phoenix	October 26-29
1988	Denver	October 31-November 3
1989	St. Louis	November 6-9
1990	Dallas	October 29-November 1
1991	San Diego	October 21-24
1992	Cincinnati	October 26-29
1993	Boston	October 25-28

GUEST PROGRAM

The San Antonio Guest Committee presents a program that highlights the attractions of the area. The activities offer a look into San Antonio's rich history and scenic beauty.

Please note that registration as a guest at the annual Meeting is a prerequisite for participation in the Guest Program and for use of the Hospitality Room. However, guest registration does not include admission to the technical program.

The Hospitality Room is in the Medina Room of the Hyatt. Hours are from noon to 5:00 p.m. on Sunday and from 8:00 a.m. to 4:30 p.m., Monday through Thursday. Light refreshments in 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 gift. Hostesses will be in the Hospitality Room to help you in any way they can. The Guest Committee welcomes you to San Antonio and hopes that you enjoy your visit.

NONTECHNICAL PROGRAM

Antique Business of Antique Jewelry
Wednesday, November 12, 10:00 to 11:00 a.m.
Hart Regency.

Since 1894, the Hammond family has been involved in jewels. Hall Hammond will share with us the secrets of estate jewelry—how to appraise and how to buy! Guests will have a chance to see the glitter and to get a basic understanding of this fascinating business.

TOURS

All tours depart from and return to the Hyatt. Tours will depart as scheduled. All tours are escorted and narrated by professional guides. Reservations for these tours will be accepted on a first-come, first-served basis. Please make note of registration and cancellation deadlines.

What To Buy and Where To Find It!
Monday, November 10, 9:00 to 10:00 a.m.

A delightful orientation to San Antonio and the marvelous hodge-podge called El Mercado. Historical facts and figures along with examples of good and unusual buys, found in the market, will be displayed and explained. The Historic Tour starts after the orientation.

Fee: \$7

Historic San Antonio

Monday, November 10, 10:00 a.m. to 3:00 p.m.

Beginning with a drive through one of the most elegant neighborhoods of the 1890s, the King William district, the first stop is the beautifully restored Steves' Homestead. Next we will visit the historic Mission San Jose. Built in 1720 and known as the "Queen of the Missions," it houses the famous Rosa's Window. The next stop is the Spanish Governor's Palace, which was completed in 1749. Lunch will be served at Mi Tierra, located in the heart of the Mexican Market. A fashion show will be presented by the Tequila Tree Specialty Shop. The tour will conclude with a shopping trip to El Mercado (the Mexican Market). Forty shops for fantastic shopping!

Fee: \$29

San Antonio Culture

Tuesday, November 11, 1:00 to 5:00 p.m.

While en route to the McNay Art Museum, the tour passes the San Antonio Museum of Art complex and the Terrell Hills area, noted for its beautiful homes. At the McNay Art Museum, there is a fine collection of French Impressionist art. Next, the tour visits the city's newest treasure, the San Antonio Botanical Center, featuring the varied terraces of Texas, along with a biblical garden, a garden for the blind, and a rose garden. Wine and soft drinks will be served before the tour proceeds to the Institute of Texas Cultures, where contributions from 26 different ethnic groups are displayed.

Fee: \$17

Natural Bridge Caverns

Wednesday, November 12, 9:00 a.m. to 3:00 p.m.

Only a short drive north, the Natural Bridge Caverns offer incredible surprises and awesome natural phenomena every inch of the way. Wear comfortable shoes (rubber soles recommended) and bring your camera! Back in San Antonio, lunch will be served in the gardenlike atmosphere of Los Patios, along the banks of Salado Creek. Quaint boutiques allow the visitor time to relax and shop.

Fee: \$32

EMPLOYMENT INTERVIEWS

Do you need qualified earth scientists to fill staff needs? Are you looking for employment in the earth-sciences fields? 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 service will be conducted in the Convention Center.

All interested organizations are urged to submit notices of their vacancies and their requests for computer listings of applicants. The nominal fee for a printout of two specialty listings is \$125. A specialty code narrows the field of your search. For example, a geologist

with background in geochemistry will be listed under the "geochemistry" specialty code.

Interview booths at the meeting may be rented for a nominal fee in half-day increments from Monday through Wednesday, November 10-12, 1986. 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 they may be obtained by contacting Clara Hodgson, Membership Coordinator, GSA headquarters.

Job seekers have found the Employment Interview Service critical to their successful search for positions. The one-year registration fee is \$25 for GSA Members and Student Associates in good standing and \$50 for nonmembers. This

applicant fee includes 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 the Membership Department, GSA headquarters.

Note to Applicants: If we receive your materials by **August 25, 1986**, your record will be included in the information that employers receive prior to the meeting. Submit your forms early to receive maximum exposure! Don't forget to indicate on your application form that you would like to interview in November.

TRANSPORTATION

AIR TRANSPORTATION

GSA has designated the Cain Travel Group of Boulder, Colorado, as the official airline reservation agent for the San Antonio meeting. United and Delta airlines are the official co-airlines.

Cain has been GSA's official agency for five years and is a proven resource for those who want to work with a travel agent in determining the best possible airfares. The agency service is free, and it can save you both time and money.

Reduced rates will be up to 40% off coach depending on the dates of travel. United and Delta have also offered an additional 5% off any available fare, but restrictions will apply. These rates will be available only to GSA travelers.

All participants booking through Cain Travel will automatically become eligible for inclusion in a drawing for two roundtrip tickets to anywhere in the continental United States prior to August 31, 1987, subject to certain restrictions. In addition, clients will be eligible for a second drawing for \$500 in travel credits.

Reservation Procedures:

1. Book early. Understand and write down the restrictions, if any.
2. Call Cain Travel at (800) 346-4747 (toll free) or (303) 443-2246, Monday-Friday, 7:30 a.m. to 5:30 p.m. MST.
3. Identify yourself as a GSA traveler.
4. The agent will quote you the discounted fare for your itinerary and confirm your reservation.
5. Payment options: Check payable to Cain Travel Group; major credit card; invoice to your firm.
6. All payment must reach Cain no later than seven days prior to departure. No reservations can be accepted by Cain after this deadline, which allows adequate mailing time.
7. Tickets will be sent to you via *certified mail* upon receipt of payment or credit card authorization.
8. In the event of a decrease in your airfare after the ticket has been issued, call Cain Travel and they will re-ticket you at the lower fare.

The Cain Travel Group will provide a customer service desk at the Convention Center.



GROUND TRANSPORTATION

GSA will not provide a shuttle service in San Antonio. Most GSA hotels are within walking distance from the Convention Center. The city offers convenient and reliable service to and from the airport and for getting around downtown. Below is information to help plan your trip.

Airport Transportation. Routes from the airport to hotels are serviced by 40-passenger buses, VIA Limousine Service. They will stop at all GSA hotel properties upon request. Hours are 7:30 a.m. to 11:55 p.m. 7 days a week, departing

from the airport every 30 minutes. Cost is currently \$5.

VIA Limousine Service will also take you back to the airport. However, hotel pick-ups are not automatic. You must make your reservation by calling VIA at 227-5251. Service runs every 30 minutes. Cost is currently \$5.

Cab fare is approximately \$12 each way per carload. Service is available 24 hours.

Downtown Transportation. VIA Streetcar services the downtown area and major sightseeing attractions. Service is available from 7:00 a.m. to 9:00 p.m. on Saturday and 7:00 a.m. to either 8:00 p.m. or 9:00 p.m. Sunday through Friday, depending on the route. Stops

are made every 10 to 20 minutes. Route maps will be available in your registration packet. Cost is 10 cents per ride.

Car Rental. For those desiring the convenience of a rental car, special low rates are offered by National, which is the official GSA car rental agency. Sample daily/weekly rates: Economy \$29/\$144; compact \$32/\$159; mid-size \$34/\$169; full-size (two-door) \$36/\$179, (four-door) \$37/\$184. Mileage is unlimited, but vehicles must be returned to the same rental location to avoid drop charges. Advance reservations are recommended. Call National at (800) 328-7949. In San Antonio call: (512) 824-8141.

HOUSING

GSA has blocked rooms at twelve hotels that are offering special convention rates to GSA meeting attendees. GSA endorses these hotels for quality, cleanliness, and service.

TO MAKE YOUR HOTEL RESERVATION

Complete IN FULL the attached Official Housing Request Form and return it immediately. The Housing Bureau will accept reservations submitted on this form ONLY. Your request must be postmarked NO LATER THAN OCTOBER 10. AFTER OCTOBER 10, reservations must be made directly with the hotel. Because many hotels will be filled by this time, you can expect to make several phone calls.

NOTE: You MUST include the hotel code on the Housing Request Form. Codes are identified in parentheses on the hotel description page.

ASSIGNMENT

Hotel rooms will be assigned on a first-come, first-served basis as they are received by the Housing Bureau. Acknowledgment will be sent to you from the Housing Bureau once your form has been processed. Confirmation will be sent from the hotel to which you have been assigned. You should receive both within three weeks of your mailing date. Please check to be sure all information is correct.

ROOM DEPOSITS

Your room will be held until 6:00 p.m. on your date of arrival unless you send one night's room deposit. Due to the possibility of unforeseen delays in your arrival time, we strongly recommend that you send in a deposit regardless of your current schedule.

To make a deposit on your room, either (1) send a check or credit card number with your housing form payable to GSA Housing Bureau (and it will be forwarded to the appropriate hotel) OR (2) wait until you have received your hotel confirmation and mail a check directly to the hotel or call the hotel with your credit card number.

CHARGES AND CANCELLATIONS

If you must CHANGE your hotel reservation, simply write or call the hotel directly and indicate the change desired.

If you must CANCEL your reservation BEFORE OCTOBER 10, write to the Housing Bureau immediately so that other reservations can be accommodated. AFTER OCTOBER 10, please cancel directly with the hotel. Your notice of cancellation must be received **within 48 hours** of your scheduled arrival or your deposit will not be refunded.

NOTE: All rooms will be taxed 10%. Remember... DON'T BE A NO-SHOW!

The logo for San Antonio, featuring the words "San Antonio" in a stylized, cursive font with a horizontal line extending from the end of the word "Antonio".

1
HYATT REGENCY —HEADQUARTERS (H Y R)

123 Losoya Street, San Antonio, TX 78205
512-222-1234 (526 rooms)

Single: \$83 Double: \$93
Suite range: \$200-\$520

Located on Riverwalk; 3 restaurants; lounge with concert pianist;
lounge with jazz; lounge with DJ; rooftop swimming pool, spa,
health facilities overlooking the Alamo; gift shop with newsstand; concierge;
in-room movies; inside paid parking

Check-in: 3:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, CB, D

2
CROCKETT (C R O)

320 Bonham, San Antonio, TX 78205
512-225-6500 (100 rooms)

Single/Double/Double-Double: \$69
Suite range: \$150-\$350

3 restaurants; swimming pool; rooftop spa;
across street from Alamo; minutes from Convention Center

Check-in: 3:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, CB, D

3
EL TROPICANO (E L T)

110 Lexington, San Antonio, TX 78205
512-223-9461 (100 rooms)

Single/Double: \$49 Double-Double/Triple: \$59
Suite range: \$125-\$404

2 restaurants; Olympic-size pool; lounge with entertainment

Check-in: 6:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, CB, D

4
EMILY MORGAN (T E M)

705 East Houston Street, San Antonio, TX 78205
512-225-8486 (125 rooms)

Single/Double: \$65-\$80

Complimentary full breakfast in bed and evening wine social;
most rooms with Jacuzzis, refrigerators, remote-control TV;
exercise room & sauna, whirlpool; outdoor pool; 1 restaurant

Check-in: 2:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, D

5
HILTON PALACIO DEL RIO (H P R)

200 South Alamo, San Antonio, TX 78205
512-222-1400 (350 rooms)

Single: \$85 Double: \$94
Suite range: \$275-\$540

Located on Riverwalk; lounges with entertainment: sing-a-long pub, piano bar;
2 restaurants; swimming pool, hot tub; inside parking;
concierge; bathroom phones

Check-in: 3:00 p.m. Check-out: 11:00 a.m. CC: AX, V, MC, D

6
HOLIDAY INN—DOWNTOWN (H I D)

318 West Durango, San Antonio, TX 78204
512-225-3211 (200 rooms)

Single: \$43 Double: \$53
Suite: \$119

Pool and patio; free in-room movies; one restaurant; one lounge

Check-in: 2:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, CB, D

7
LaQUINTA—CONVENTION CENTER (L Q C)

1001 East Commerce Street, San Antonio, TX 78201
512-222-9181 (100 rooms)

Single: \$35 Double: \$42 Double/Double: \$42
(No suites available)

Free parking; free local calls, free HBO and Showtime; 1 restaurant;
1 cocktail lounge; outdoor pool

Check-in: 1:00 p.m. Check-out: 1:00 p.m. CC: AX, V, MC

8
LaQUINTA—MARKET SQUARE (L Q M)

900 Dolorosa Street, San Antonio, TX 78207
512-271-0001 (100 rooms)

Single: \$35 Double: \$40 Double/Double: \$45
(No suites available)

24-hour restaurant nearby; near El Mercado Market Place; free Showtime;
free coffee in lobby

Check-in: 1:00 p.m. Check-out: 1:00 p.m. CC: AX, V, MC

9
MARRIOTT (S A M)

711 East Riverwalk, San Antonio, TX 78205
512-224-4555 (300 rooms)

Single: \$89 Double: \$104
Suite range: \$260-\$435

1 restaurant; 2 cocktail lounges; in-house first-aid; airline ticket counter;
information desk; newsstand; sundry shop; bottle shop; children's rec center;
indoor & outdoor swimming pool; concierge; 50% rooms with balconies

Check-in: 4:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, CB, D

10
MENGER (M E N)

204 Alamo Plaza, San Antonio, TX 78205
512-223-4361 (200 rooms)

Single: \$44 Double: \$54
Suite range: \$85-\$144

Free in-room movies; 2 restaurants; 2 cocktail lounges;
choose antique-furnished or Texas-size rooms; outdoor swimming pool

Check-in: 6:00 p.m. Check-out: 1:00 p.m. CC: AX, V, MC, CB, D

11
ST. ANTHONY INTERCONTINENTAL (S A I)

300 East Travis, San Antonio, TX 78298
512-227-4392 (100 rooms)

Single/Double: \$75
Suite range: \$175-\$450

Traditional accommodations with antiques; 3 restaurants;
2 cocktail lounges with entertainment; health facilities;
morning newspaper; in-house movies; paid parking

Check-in: 3:00 p.m. Check-out: 12:00 noon CC: AX, V, MC, CB, D

12
TRAVELODGE ON THE RIVER (T R R)

100 Villita Street, San Antonio, TX 78205
512-226-2271 (100 rooms)

(Suggested for Student Housing)

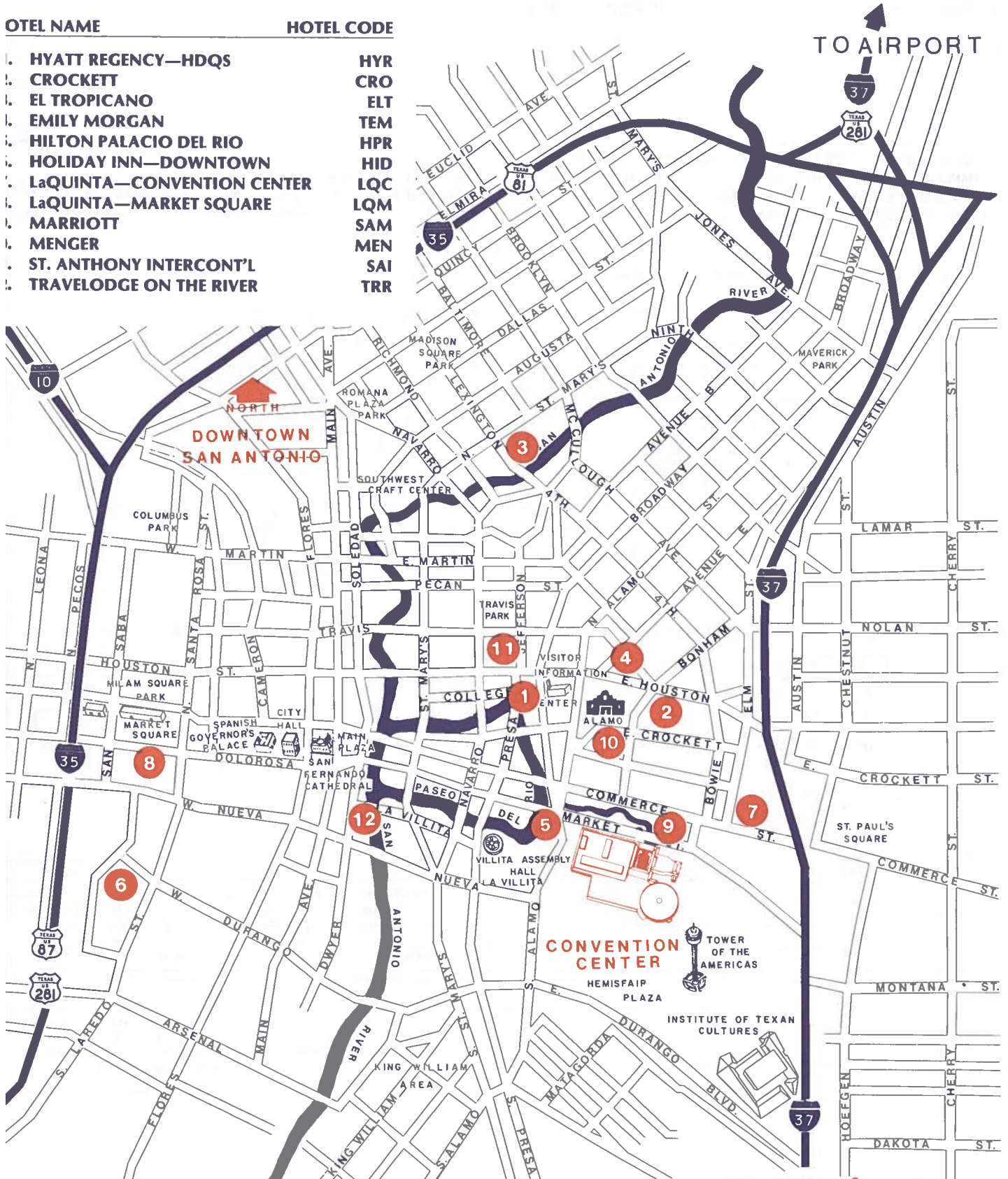
Single: \$40 Double: \$45 Double/Double: \$51
Suite: \$135

Free in-house movies; free coffee and pot in room; free local calls
Check-in: 2:00 p.m. Check-out: 12:00 noon CC: AX, V, MC

Credit card codes: AX = American Express / V = VISA / MC = MasterCard / CB = Carte Blanche / D = Diners Club
All hotels offer discounts or free rooms for children. Check for age limit.

DOWNTOWN SAN ANTONIO

OTEL NAME	HOTEL CODE
HYATT REGENCY—HDQS	HYR
CROCKETT	CRO
EL TROPICANO	ELT
EMILY MORGAN	TEM
HILTON PALACIO DEL RIO	HPR
HOLIDAY INN—DOWNTOWN	HID
LaQUINTA—CONVENTION CENTER	LQC
LaQUINTA—MARKET SQUARE	LQM
MARRIOTT	SAM
MENGER	MEN
ST. ANTHONY INTERCONT'L	SAI
TRAVELODGE ON THE RIVER	TRR



OFFICIAL HOUSING REQUEST FORM

PLEASE READ CAREFULLY AND COPY FOR YOUR RECORDS

FOR HOUSING BUREAU USE ONLY

MAIL TO:

HOUSING
SAN ANTONIO CONVENTION
& VISITORS BUREAU
P.O. BOX 2277
SAN ANTONIO, TEXAS 78298

- PLEASE PRINT OR TYPE ALL ITEMS TO ASSURE ACCURACY.
- COMPLETE EACH PART BELOW IN DETAIL FOR CORRECT AND RAPID COMPUTER PROCESSING.
- SHOULD MORE THAN TWO (2) ROOMS BE NEEDED, SUPPLEMENTAL ROOM LIST *MUST* BE ATTACHED USING SAME FORMAT AS IN PART III.
- ALL ACKNOWLEDGEMENTS WILL BE SENT TO INDIVIDUAL INDICATED IN PART I. ACTUAL CONFIRMATION WILL FOLLOW FROM HOTEL.

PART I

INSTRUCTIONS: Complete requested data using abbreviations as necessary.
(NAME OF PERSON REQUESTING ROOMS)

(LAST NAME)	(FIRST)	
(NAME OF COMPANY OR FIRM)		
(STREET ADDRESS OR P.O. BOX NUMBER)		
(CITY)	(STATE)	(ZIP — USA)
(COUNTRY)	(AREA CODE)	(PHONE NUMBER)

PART II

INSTRUCTIONS: Select SIX Hotel/Motels of your choice. No request will be processed without SIX choices.

FIRST CHOICE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (HOTEL CODE)	SECOND CHOICE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (HOTEL CODE)	THIRD CHOICE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (HOTEL COD
FOURTH CHOICE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (HOTEL CODE)	FIFTH CHOICE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (HOTEL CODE)	SIXTH CHOICE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (HOTEL COD

PART III

- INSTRUCTIONS:
1. PRINT OR TYPE NAMES OF ALL PERSONS OCCUPYING EACH ROOM.
 2. SELECT TYPE ROOM DESIRED WITH ARRIVAL AND DEPARTURE DATES.
 3. SUPPLEMENTAL LIST FOR ADDITIONAL ROOM *MUST* USE SAME FORMAT.
 4. PRINT OR TYPE LAST NAME FIRST.

	GUEST NAME/S (PRINT LAST NAME FIRST)	P + 1 — Parlor & one bedroom	P + 2 — Parlor & two bedrooms								
ROOM NO. 1	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%;">1.</td><td style="width: 95%;"></td></tr> <tr><td>2.</td><td></td></tr> <tr><td>3.</td><td></td></tr> <tr><td>4.</td><td></td></tr> </table>	1.		2.		3.		4.		<p>CHECK ONE <input type="checkbox"/> Single <input type="checkbox"/> Triple <input type="checkbox"/> Double <input type="checkbox"/> Quad <input type="checkbox"/> Twin <input type="checkbox"/> P + 1 <input type="checkbox"/> DbI/DbI <input type="checkbox"/> P + 2</p>	<p>ARR. DATE _____ DEP. DATE _____ ARR. TIME _____ <input type="checkbox"/> AM <input type="checkbox"/> PM (Check one) NOTE: Reservation will be held only until 6 p.m. unless special arrangements are made directly with hotel. The hotel may request a deposit.</p>
1.											
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3.											
4.											
ROOM NO. 2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%;">1.</td><td style="width: 95%;"></td></tr> <tr><td>2.</td><td></td></tr> <tr><td>3.</td><td></td></tr> <tr><td>4.</td><td></td></tr> </table>	1.		2.		3.		4.		<p>CHECK ONE <input type="checkbox"/> Single <input type="checkbox"/> Triple <input type="checkbox"/> Double <input type="checkbox"/> Quad <input type="checkbox"/> Twin <input type="checkbox"/> P + 1 <input type="checkbox"/> DbI/DbI <input type="checkbox"/> P + 2</p>	<p>ARR. DATE _____ DEP. DATE _____ ARR. TIME _____ <input type="checkbox"/> AM <input type="checkbox"/> PM (Check one) NOTE: Reservation will be held only until 6 p.m. unless special arrangements are made directly with hotel. The hotel may request a deposit.</p>
1.											
2.											
3.											
4.											

DEPOSIT

Remit in U.S. funds. Make checks payable to GSA Housing Bureau or charge:

Amer Exp
 MasterCard
 Choice
 VISA
 Diners Club/Carte Blanche
 Card Number _____ Expires ____/____

NOTE: PLEASE RECHECK ALL ITEMS FOR CORRECT INFORMATION

CONVENIENCE INFORMATION

FORMATION/MESSAGES

GSA information and message desks will be located at both the Convention Center and the Regency, Friday, November 7, through Saturday, November 13. The desks will be staffed to answer your questions about the GSA program as well as the San Antonio area.

Please leave the exact name and phone number of your hotel with both your home and office. Other phone numbers to use are:

Convention Center:
GSA Information (512) 224-2541
Convention Center:
GSA Message Desk (512) 224-0578

FOREIGN VISITORS

Assistance with housing and other information is available to foreign visitors by contacting: Alan P. Morris, Div. Earth and Physical Sciences, University of Texas at San Antonio, San Antonio, TX 78285. Phone (512) 691-4455.

CHILD CARE SERVICE

GSA does not make arrangements for babysitting services. Please contact the Housekeeping Department or the Front Desk Manager in your hotel for information.

Parents who are willing to take part in cooperative child care should send name, address, and phone number to the Events Coordinator, GSA headquarters, NO LATER THAN OCTOBER 24, 1986. Optional: You may send the name of the hotel and phone of where you will stay in San Antonio, and the names and ages of your children. A list of information will be sent by October 30 to those who have expressed interest in the program. Parents can then contact others on the list to set up an exchange of services.

ABSTRACTS WITH PROGRAMS

If you have previously purchased, *Abstracts with Programs* for the 1986 Annual Meeting it is available in four ways:

Advance Mailing: If you complete the order below and mail it to be RECEIVED at the Convention Center by September 1, 1986, copies sent to U. S. addresses should arrive on or before October 18, 1986, providing excessive delays in the postal system are not encountered. Price for non-members is \$15; for GSA members \$12.

2. Reserved On-Site in San Antonio: If you would like a copy reserved for pickup at the Annual Meeting or for extra copies, purchase from ABSTRACTS WITH PROGRAMS line on the Preregistration Form. Pick up your copy in the Registration Area, Convention Center. Price: \$18. (If you have already ordered a copy on your 1986 GSA dues form, this will give you a duplicate copy. Please check your records prior to ordering.)

3. Open On-Site: Purchase on-site, Registration Area, Convention Center, from a limited quantity available. Price: \$18.

4. GSA Membership Dues Form: You may have already ordered a copy when you paid your dues. If so, placing an order under option 1 or 2 will give you a duplicate copy.

**USE THIS FORM FOR OPTION 1
ADVANCE MAILING ONLY.**

ABSTRACTS WITH PROGRAMS 1986 ANNUAL MEETING

MAIL SEPARATELY TO: GSA Publication Sales, P.O. Box 9140, Boulder, CO 80301.

_____ advance copies of *Abstracts with Programs* 1986 at \$15 per copy. (\$12 for GSA member; write your membership number here _____)

_____ Enclosed is check/money order in U.S. funds for \$_____. * (make checks payable to GSA Publication Sales)

Charge to: American Express Diners/Carte Blanche Choice MasterCard VISA (check one)

Account # _____ Exp. Date _____

Telephone (work) _____ (home) _____

Signature _____

Name _____

Address _____

City/State _____ Zip/Country _____

NOTE: Order should be RECEIVED by September 1, 1986, to guarantee arrival (domestic mail only) by October 18, 1986.

Colorado residents add sales tax.



REGISTRATION

PREREGISTRATION DEADLINE: MUST BE RECEIVED NO LATER THAN OCTOBER 10.

1. There is a 15% savings in registration fees if you register before October 10! Advance registration is suggested for many of the special activities because of participation limits. Use the preregistration form provided in this announcement.
2. Registration is required for all attendees, including field trip participants and guests. Badges will be required for ALL activities 10:00 a.m. Sunday through 5:00 p.m. Thursday. There will be a fee charged for all lost badges.
3. Registration discounts are given to GSA and Associated Society members. Associated Societies that qualify for this discount are indicated on the registration form. Please indicate your affiliation(s) and member number, and register using the member rates.
4. Full payment MUST accompany registration. Unpaid purchase orders are not accepted as valid registration. Credit cards are accepted as indicated on preregistration form. If using a credit card, please recheck the card number given—errors will delay your registration.
5. Register one professional or student per form. Copy the form for your records. One day registrants MUST indicate the day they plan to attend on the registration form.
6. Guest registration is required for guests attending guest activities, special events, and luncheons. The registration fee does not include admission to the technical sessions. Guest registrants MUST be accompanied by either a professional or student registrant.
7. CURRENT student ID is required to obtain student rates at both the on-site and preregistration counters.

REGISTRATION FEES

	Advance*	On-Site	One-Day
Professional—Member	85.00	100.00	50.00
Professional—Nonmember	125.00	140.00	70.00
Student—Member	42.00	50.00	25.00
Student—Nonmember	62.00	70.00	35.00
Guest	30.00	45.00	N/A

*Registration fees received before October 10, 1986.

ON-SITE REGISTRATION SCHEDULE

Convention Center, Arcade Area

Sunday, November 9	10:00 a.m. to 7:30 p.m.
Monday, November 10	7:30 a.m. to 5:00 p.m.
Tuesday, November 11	7:30 a.m. to 5:00 p.m.
Wednesday, November 12	7:30 a.m. to 2:00 p.m.
Thursday, November 13	7:30 a.m. to 2:00 p.m.

CANCELLATIONS AND REFUNDS

GSA will refund advance registration fees for cancellations received in writing by **OCTOBER 17. NO REFUNDS WILL BE MADE ON CANCELLATION NOTICES RECEIVED AFTER THIS DATE.** Refunds will be mailed from GSA after the meeting; a \$10 processing fee will be charged. 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.

NEW MEMBERSHIP DISCOUNTS

A \$40 member discount on registration applies to any professional member of GSA or an Associated Society. The Associated Societies that qualify are listed on the registration form. Professional registrants who paid the nonmember

registration fee and apply for GSA membership by March 31, 1987, will be entitled to a \$40 reduction in the 1987 membership fee. Students will receive a \$15 discount from the 1987 Student Associate membership fee. Only ON-site discount will apply per person. In order to receive the reduction, a copy of the meeting registration form **MUST** be attached to the membership application. Membership applications are available from GSA headquarters. During the meeting, you can pick up applications at the GSA Bookstore (Exhibition Hall, Booth #328), GSA Employment Service or Membership Desk, Registration area, Convention Center.

ASSOCIATED SOCIETIES MEETING WITH GSA

Cushman Foundation
 Geochemical Society
 Geoscience Information Society
 Mineralogical Society of America
 National Association of Geology Teachers
 Paleontological Society
 Society of Economic Geologists

INTERNATIONAL JOURNAL

1986 GSA ANNUAL MEETING • NOV. 10-13 • SAN ANTONIO

PREREGISTRATION must be RECEIVED by October 10. FULL payment and form MUST accompany all preregistration requests. Unpaid purchase orders NOT accepted as valid registration. One form per registrant. Participants in all events, short courses excluded, must pay a preregistration fee. CANCELLATION deadline: October 17. No refunds on cancellations received after this date. Confirmation card will be your receipt.

Type or 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 _____

Member Affiliations: (1)GSA _____ (2)CF _____ (3)GS _____ (4)GIS _____ (5)MSA _____
 (6)NAGT _____ (7)PS _____ (8)SEG _____ Member # _____

PREREGISTRATION FEES

(registration required for participation in all events)

	Price	Qty	Column A	Amount
Professional Member (member affiliation checked above)	(1) \$ 85	_____	_____	_____
Member One-Day (circle day S M T W T)	(2) \$ 50	_____	_____	_____
Professional Nonmember	(3) \$125	_____	_____	_____
Nonmember One-Day (circle day S M T W T)	(4) \$ 70	_____	_____	_____
Student Member (member affiliation checked above)	(5) \$ 42	_____	_____	_____
Member One-Day (circle day S M T W T)	(6) \$ 25	_____	_____	_____
Student Nonmember	(7) \$ 62	_____	_____	_____
Nonmember One-Day (circle day S M T W T)	(8) \$ 35	_____	_____	_____
Guest (fill in name above for badge)	(9) \$ 30	_____	_____	_____
What to Buy & Where	Nov 10 (10) \$ 7	_____	_____	_____
Historic San Antonio & Luncheon	Nov 10 (11) \$ 29	_____	_____	_____
San Antonio Culture	Nov 11 (12) \$ 17	_____	_____	_____
Natural Bridge Caverns & Luncheon	Nov 12 (13) \$ 32	_____	_____	_____
Burros & Burritos	Nov 12 (14) \$ 28	_____	_____	_____
Invitational Tennis	Nov 9 (15) \$ 15	_____	_____	_____
10K Run (circle T-shirt size: S M L)	Nov 12 (16) \$ 7	_____	_____	_____
5K Run (circle T-shirt size: S M L)	Nov 12 (17) \$ 7	_____	_____	_____
Total of Column A		_____	_____	_____

GUEST ACTIVITIES

	Price	Qty	Column A	Amount
Computer Graphics	Nov 8-9 (55) \$270	_____	_____	_____
Glacial-Marine Sedimentation	Nov 8-9 (56) \$100	_____	_____	_____
Contaminant Hydrogeology	Nov 8-9 (57) \$100	_____	_____	_____
Seawater Chronostratigraphy	Nov 9 (58) \$ 50	_____	_____	_____
Geologic Use of Microcomputers	Nov 9 (59) \$ 85	_____	_____	_____
Fossil Radiolaria	Nov 9 (60) \$ 75	_____	_____	_____
Principles of Rock Mechanics	Nov 14-15 (61) \$135	_____	_____	_____
ABSTRACTS WITH PROGRAMS — Reserved (on-site pickup)	(62) \$ 18	_____	_____	_____
Total Column B		_____	_____	_____
Total Column A		_____	_____	_____
Column A + B = Total Remittance		_____	_____	_____

SPECIAL EVENTS

Remit in U.S. funds, payable To GSA Annual Meeting

or charge: American Express Choice Diners Club/Carte Blanche MasterCard VISA

Card expires: mo / yr _____ card number _____

Signature _____

TICKETED MEAL FUNCTION

	Price	Qty	Amount
Engineering Geology	Nov 11 (18) \$ 15	_____	_____
Geoscience Information Society	Nov 11 (19) \$ 15	_____	_____
History of Geology Division	Nov 11 (20) \$ 15	_____	_____
Hydrogeology Division	Nov 11 (21) \$ 15	_____	_____
Mineralogical Society	Nov 11 (22) \$ 15	_____	_____
National Association of Geology Teachers	Nov 11 (23) \$ 15	_____	_____
Paleontological Society	Nov 11 (24) \$ 15	_____	_____
Sedimentary Geology Breakfast	Nov 11 (25) \$ 10	_____	_____
Women Geoscientists Breakfast	Nov 11 (26) \$ 10	_____	_____
Coal Geology Division	Nov 12 (27) \$ 15	_____	_____
Geochemical Society	Nov 12 (28) \$ 15	_____	_____
Quaternary Geology & Geomorphology Division	Nov 12 (29) \$ 15	_____	_____
Society of Economic Geologists	Nov 12 (30) \$ 15	_____	_____

FIELD TRIPS

	Price	Qty	Amount
1 Geomorphology of Texas Panhandle	Nov 7-9 (31) \$235	_____	_____
1a Geomorphology #1 without airfare	Nov 7-9 (32) \$155	_____	_____
2 Archaeological Geology, S. High Plains	Nov 7-9 (33) \$235	_____	_____
2a Archaeological #2 without airfare	Nov 7-9 (34) \$155	_____	_____
3 Igneous Geology, Trans-Pecos Texas	Nov 6-9 (35) \$250	_____	_____
4 Ouachita Mountain Geology	Nov 6-9 (36) \$315	_____	_____
4a Ouachita Mountain #4 without airfare	Nov 6-9 (37) \$236	_____	_____
5 Engineering Geology of San Antonio	Nov 9 (38) \$ 45	_____	_____
6 Stratigraphy & Structure, Maverick Basin	Nov 7-9 (39) \$265	_____	_____
7 Cambrian Wichita Mountains Igneous	Nov 7-9 (40) \$326	_____	_____
7a Cambrian Wichita #7 without airfare	Nov 7-9 (41) \$235	_____	_____
8 Edwards Aquifer Hydrology, San Antonio	Nov 8 (42) \$ 55	_____	_____
9 Late Pennsylvanian Paleoenvironments	Nov 7-8 (43) \$140	_____	_____
10 Gulf Coast Lignites	Nov 6-9 (44) \$265	_____	_____
11 Geology & Mineral Resources—Salt Domes	Nov 9 (45) \$ 70	_____	_____
12 Southern Oklahoma Sedimentation	Nov 7-9 (46) \$326	_____	_____
12a Southern Oklahoma #12 without airfare	Nov 7-9 (47) \$235	_____	_____
Postmeeting		_____	_____
13 Precambrian Granites, Central Texas	Nov 14-15 (48) \$150	_____	_____
14 Edwards Limestone Aquifer History	Nov 14 (49) \$ 60	_____	_____
15 South Texas Modern Depositional System	Nov 14-16 (50) \$200	_____	_____
16 Stratigraphy of El Paso Borderland	Nov 13-15 (51) \$190	_____	_____
16a Stratigraphy #16 without airfare	Nov 13-15 (52) \$125	_____	_____
17 Texas Cretaceous Volcanic Centers	Nov 14-15 (53) \$ 95	_____	_____
18 Platform Comanchean, Central Texas	Nov 13-15 (54) \$150	_____	_____

SHORT COURSES

	Price	Qty	Amount
(meeting registration not required)		_____	_____
Computer Graphics	Nov 8-9 (55) \$270	_____	_____
Glacial-Marine Sedimentation	Nov 8-9 (56) \$100	_____	_____
Contaminant Hydrogeology	Nov 8-9 (57) \$100	_____	_____
Seawater Chronostratigraphy	Nov 9 (58) \$ 50	_____	_____
Geologic Use of Microcomputers	Nov 9 (59) \$ 85	_____	_____
Fossil Radiolaria	Nov 9 (60) \$ 75	_____	_____
Principles of Rock Mechanics	Nov 14-15 (61) \$135	_____	_____
ABSTRACTS WITH PROGRAMS — Reserved (on-site pickup)	(62) \$ 18	_____	_____
Total Column B		_____	_____
Total Column A		_____	_____
Column A + B = Total Remittance		_____	_____

FOR OFFICE USE ONLY

Deposit Date _____ Comment _____

Balance Due \$ _____ A/R _____

Refund \$ _____ A/P _____

Refund Ck # _____

Refund Date _____

MAIL TO: 1986 GSA ANNUAL MEETING, P.O. BOX 9140, BOULDER, CO 80301.

The
Earth
has a
spirit
of
Growth

For membership information, contact:
The Geological Society of America
Membership Department, P.O. Box 9140
3300 Penrose Place, Boulder, Co 80301
(303) 447-2020



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