

## PREVIEWS

<b>Diagenesis from enhanced hydrocarbon recovery</b>	<i>Observed diagenetic changes from a rising hydrocarbon-water contact during production time in the Haidach field, Austria, include carbonate cementation, K-feldspar overgrowths, authigenic quartz overgrowths, pyrite formation, and poorly crystallized authigenic clay minerals.</i> . . . . . 789
<b>Two classic shales studied</b>	<i>Hydrocarbon retention and porosity evolution are generally strongly related to changes in kerogen density brought about by swelling and shrinkage as a function of thermal maturation. Free oil and bitumen are not associated with the layers richest in organic matter.</i> . . . . . 807
<b>Diagenesis in tight gas sandstones</b>	<i>This study documents the types and degree of diagenesis that the Bashijiqike reservoir, Tarim Basin, China, has experienced. It examines the mechanisms for maintaining good reservoir quality in sandstones that are buried at great depth.</i> . . . . . 829
<b>The Arabian plate and unconventional targets</b>	<i>High total organic carbon horizons, northern Saudi Arabia, are being assessed for their unconventional shale-gas potential. Heterogeneity has resulted from the interplay of sea-floor topography, ocean currents, sediment supply, and variations in the melting rate of the Gondwanan ice sheet.</i> . . . . . 863
<b>Deformation adjacent to salt diapirs</b>	<i>Understanding the structural deformation and state of stress adjacent to salt bodies is critical to petroleum exploration and drilling. Upbuilding in tectonically stable areas is a significant component of salt diapir growth. Once the diapir roof is penetrated, it forms a megaflap.</i> . . . . . 887
<b>SEM-MLA for detrital provenance analysis</b>	<i>This study of scanning electron microscopy mineral-liberation analysis provenance analysis shows that diverse processes operate in a complex deep-sea environment over time to control sediment routing and accumulation.</i> . . . . . 907

## AAPG BULLETIN STAFF

### *Editorial*

Technical Publications Assistant Team Lead/Paula Sillman  
Technical Editor/Andrea Sharrer  
Phone: (918) 584-2555  
(800) 364-2274 (U.S. and Canada)  
Fax: (918) 560-2632  
E-mail: bulletin@aapg.org

### *Production*

Cover/Matt Randolph  
Production/Sheridan Journal Services  
Waterbury, Vermont  
Printing/Sheridan - Sheridan PA  
Hanover, Pennsylvania

### *Subscriptions*

Members	Nonmembers
Membership Dept.	Accounting Dept.
Phone: (918) 584-2555	(918) 584-2555
Fax: (918) 560-2694	(918) 560-2652
Toll Free: (800) 364-2274	bulletinsubscriptions@aapg.org (U.S. and Canada)

AAPG grants permission for a single photocopy of an item from the AAPG Bulletin for personal use. Authorization for additional photocopies of items from the AAPG Bulletin in any form (hardcopy, digital/electronic scanning, or other digital transformation into computer-readable and/or transmittable form) for personal or corporate use is granted provided the appropriate fee is paid directly to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, Massachusetts 01923, <http://www.copyright.com>. For circumstances occurring outside authorization of Copyright Clearance Center contact permissions@aapg.org.

The AAPG Bulletin (ISSN 0149-1423) is published monthly by the American Association of Petroleum Geologists. Offices are located at 1444 South Boulder Avenue, Tulsa, Oklahoma 74119-3604. Periodicals postage paid at Tulsa, Oklahoma, and at additional mailing offices.

**POSTMASTER:** send change of address to AAPG Bulletin, P.O. Box 979, Tulsa, Oklahoma 74101-0979.

#### SUBSCRIPTIONS

Institutional subscriptions are \$540 U.S. by surface mail; \$700 non-U.S. by Airmail. AAPG member subscriptions are included in the dues. Single copies: \$35 member, \$45 nonmember. Prices subject to change without notice. Claims for nonreceipt of any issue, if reported within three months of the date of publication, will be filled gratis. Back issues, if available, may be ordered from the Association.

Copyright © 2017 by the American Association of Petroleum Geologists. All rights reserved. Phone (918) 584-2555, fax (918) 560-2632, e-mail: bulletin@aapg.org

#### CANADA SUBSCRIPTIONS

Canada Post Agreement Number 40036158. Send change of address information and blocks of undeliverable copies to P.O. Box 1051, Fort Erie, ON, L2A 6C7, Canada.

The American Association of Petroleum Geologists (AAPG) does not endorse or recommend any products or services that may be cited, used or discussed in AAPG publications or in presentations at events associated with AAPG.



**AAPG Editor**  
**BARRY JAY KATZ**  
Chevron Energy Technology Company  
Houston, Texas

#### SENIOR ASSOCIATE EDITORS

Kent Bowker, Bowker Petroleum, The Woodlands, TX  
Caroline M. Burberry, University of Nebraska-Lincoln, Lincoln, NE  
Richard Groshong, University of Alabama, Tuscaloosa, AL  
Colin P. North, University of Aberdeen, Aberdeen, Scotland  
Stephen Ruppel, Bureau of Economic Geology, The University of Texas at Austin, Austin, TX

#### ASSOCIATE EDITORS

##### **Spatial**

Bret J. Fossum, ConocoPhillips, Houston, TX

##### **2016-2017**

Patricia F. Allwardt, ConocoPhillips, Houston, TX  
Janok P. Bhattacharya, McMaster University, Hamilton, ON, Canada  
Brigitte Doligez, Institut Francais du Petrole, Cedex, France  
Julia F. W. Gale, University of Texas at Austin, Austin, TX  
Chenglin Gong, University of Texas at Austin, Austin, TX  
Fang Hao, China University of Petroleum, Beijing, China  
Nicholas B. Harris, University of Alberta, Edmonton, AB, Canada  
Qinhong Hu, University of Texas at Arlington, Arlington, TX  
Dale A. Leckie, Nexen Inc., Calgary, AB, Canada  
Terrilyn Olson, FEI, Denver, CO  
Bradford E. Prather, Shell Upstream Americas, Houston, TX

##### **2017-2018**

Mohammed S. Ameen, Saudi Aramco, Dhahran, Saudi Arabia  
Donna S. Anderson, EOG Resources Inc., Golden, CO  
Claudio Bartolini, Repsol, The Woodlands, TX  
Arthur E. Berman, Sugar Land, TX  
William Craddock, USGS, Reston, VA  
Stephen P. Cumella, Consulting Geologist, Denver, CO  
William D. DeMisi, Goldman Sachs, Houston, TX  
Thomas L. Dunn, Chevron, Houston, TX  
Melanie Everett, Chevron Energy Technology Company, Houston, TX  
Ursula Hammes, Bureau of Economic Geology, The University of Texas at Austin, Austin, TX  
Stuart D. Harker, Aberdeen, Scotland  
William A. Hill, BP, Houston, TX  
Alexander A. Kitchka, Centre for Aerospace Research of the Earth at Institute of Geological Sciences (CASRE), Kiev, Ukraine  
Andres Mora, Instituto Colombiano del Petróleo-ICP, Colombia  
Joyce E. Neilson, University of Aberdeen, Aberdeen, Scotland  
Kenneth E. Peters, Schlumberger and Stanford University, Mill Valley, CA  
Dave A. Pivnik, Apex International Energy, Houston, TX  
Sandro Serra, Serra GeoConsulting LLC, Bellaire, TX  
Carl K. Steffensen, BP America Inc., Houston, TX  
Peter D. Warwick, U.S. Geological Survey, Reston, VA

# The American Association of Petroleum Geologists

## EXECUTIVE COMMITTEE 2016–2017

President: PAUL W. BRITT  
Sections Vice President: DANIEL E. SCHWARTZ  
Regions Vice President: PETER M. LLOYD  
President-Elect: CHARLES STERNBACH  
Secretary: HEATHER L. LAREAU  
Treasurer: MARTIN HEWITT  
Editor: BARRY KATZ  
Chair, House of Delegates: JIM MCGHAY

## ADVISORY COUNCIL, 2016–2017

### Ex-Officio

JOHN R. HOGG, Chair  
RANDI MARTINSEN  
LEE KRYSNIK  
ANNE C. DRAUCKER  
TIMOTHY M. MURIN  
CHANDLER T. WILHELM  
ROBERT C. SHOUP

### Elected

CRAIG ECKERT, Eastern Section  
JOHN JORDAN, JR., Gulf Coast Section  
MICHAEL F. McGOWAN, Mid-Continent Section  
STEPHEN A. "TONY" REID, Pacific Section  
JOHN C. LORENZ, Rocky Mountain Section  
ROBERT E. WEBSTER, Southwest Section  
NOSA OMORODION, Africa Region  
PETER GRANT, Asia Pacific Region  
CLINTON R. TIPPETT, Canada Region  
ANDREA MOSCARIELLO, Europe Region  
MIGUEL RAMIREZ, Latin America and Caribbean Region

### Appointed Observer

ROBERT KUCHINSKI, Middle East Region

## AAPG BOARDS

JAMES PAINTER, Corporate Advisory Board  
BRET J. FOSSUM, Datapages Board  
PETER MACKENZIE, GEO-DC Governance Board  
JEFFREY W. LUND, IP LLC Board

## AAPG COMMITTEE CHAIRS

STEVE SONNENBERG, 100th Anniversary (Ad Hoc)  
(Co-Chair)  
PAUL WEIMER, 100th Anniversary (Ad Hoc)  
(Co-Chair)  
BOB COUNTRYMAN, Association Group Insurance  
DOUG COOK, Astrogeology  
MARTIN HEWITT, Audit  
MARTIN HEWITT, Budget Review & Finance  
CRAIG SHIPP, Distinguished Lecture (Co-Chair)  
MATT JACKSON, Distinguished Lecture (Co-Chair)  
LORI SUMMA, Education  
MIKE UNGER, Education Awards  
KAY PITTS, Ethics  
DAVID STORY, Field Safety  
HUYEN BUI, Geophysical Integration  
R. RANDY RAY, GEOF  
JIM McDONALD, GIS Publication

ROGERS HARDY, History of Petroleum Geology  
KRISTEN WOODEN, Imperial Barrel (Chair)  
JOHN BROCK, Investment  
WILLIAM (BILL) C. STEPHENS, Membership (Ad Hoc)  
JESSIE HOLLAND, Membership Career Services  
STEVE ALLEN, Preservation of Geoscience Data  
(Co-Chair)  
SARAH RAMDEEN, Preservation of Geoscience Data  
(Co-Chair)  
ART BROWNING, Publications Pipeline  
TBD, Public Outreach  
DAVID BLANCHARD, Regions (Co-Chair)  
VICTOR VEGA, Regions (Co-Chair)  
JEAN-YVES CHATELLIER, Research (Co-Chair)  
JOHN SUTER, Research (Co-Chair)  
SOCHI IWUOHA, Reservoir Development  
RUSTY RIESE, Resource Evaluation  
MARY BROUARD, Sections  
SCOTT W. DOUGLAS, Student Chapters (Co-chair)  
JAYNE SLOAN, Student Chapters (Co-chair)  
FERNANDO ZIEGLER, Student Expo  
ROBBIE GRIES, Visiting Geoscientist Program (Co-Chair)  
ANDRAS NEMETH, Visiting Geoscientist Program  
(Co-Chair)  
KATHERINE HERLEMAN, Youth Educational Activities

## SPECIAL INTEREST GROUPS (SIGS)

MEREDITH FABER, Membership Young Professional  
(Co-chair)  
JON ALLEN, Membership Young Professional (Co-chair)  
BARBARA TILLOTSON, Professional Women in Earth  
Sciences (Chair)  
TERRA GEORGE, Professional Women in Earth  
Sciences (Co-chair)

## AAPG SECTION OFFICERS

### Eastern Section

JOHN HICKMAN, President  
PATRICK GOODING, Vice President  
ANDREW WAGGENER, Secretary  
SCOTT GORHAM, Treasurer  
CRAIG ECKERT, Past President

### Gulf Coast Section (GCAGS)

THOMAS EWING, President  
RALPH RICHARDSON, Vice President  
GENE AMES, III, 2017 GCAGS Convention  
General Chairman  
DANIEL SUTTON, Treasurer  
BRENT HOPKINS, Past President

### Mid-Continent Section

H. W. PEACE, II, President  
DOUG DAVIS, JR., Vice President  
TERRY HOLLRAH, Secretary  
MICHAEL ALLISON, Treasurer  
DONALD G. BURDICK, Past President

### Pacific Section

ROBERT A. HORTON, JR., President  
EMILY FISHER, Vice President  
MIKE NELSON, President-Elect

BECCA SCHEMPP, Secretary  
LISA ALPERT, Treasurer  
SIMMIE CHEHAL, Treasurer-Elect  
VAUGHN THOMPSON, Editor-in-Chief  
KURT NEHER, Past President

### Rocky Mountain Section

ANDREW M. HENNES, President  
JULIA LEMASTER, President-Elect  
LYNETTE GEORGE, Secretary-Treasurer  
HEIDI SCHOENSTEIN, Secretary-Treasurer-Elect  
CATHERINE E. CAMPBELL, Past President

### Southwest Section

MICHAEL A. RAINES, President  
NICOLAS O. BRISSETTE, President-Elect  
AMY E. PATTERSON, Vice President  
ROY L. YATES, Secretary  
KELLI SNIDOW, Treasurer  
DARRELL MAULDIN, Past President

## AAPG REGION OFFICERS

### Africa Region

WILLIAM BOSWORTH, President  
SCOTT DUROCHER, Vice President  
ADEGBENDGA "FEMI" ESAM, President-Elect  
MIMONITU OPUWARI, Secretary  
AJIBOLA OYEBAMIIJ, Treasurer  
DAVID BLANCHARD, Past President

### Asia Pacific Region

PETER GRANT, President  
CHRIS OGLESBY, Vice President  
REETU RAGINI, Secretary  
MICHAEL "MICK" MCWALTER, Treasurer  
PETER BAILLE, Past President

### Canada Region

FRANCOIS C. MARECHAL, President  
MAREN BLAIR, Vice President/Treasurer  
MERIEM GRIFI, Secretary/Foreman

### Europe Region

JONATHAN CRAIG, President  
FIONA MACAULAY, President-Elect  
JONATHAN REDFERN, Secretary  
EDWIGE ZANELLA, Treasurer  
KEITH GERDES, Past President

### Latin America and Caribbean Region

VICTOR VEGA, President  
SYLVIA COUTO AJOS, Vice President  
PEDRO A. ALARCON MEDINA, President-Elect  
XAVIER MOONAN, Treasurer  
VICTOR RAMIREZ, Past President

### Middle East Region

ROBERT KUCHINSKI, President  
TBD, Vice President  
SALIM AL-MAHROUQI, President-Elect  
SUBRATA CHAKRABORTY, Secretary  
TBD, Treasurer  
SA'ID A. AL HAIRI, Past President

# The American Association of Petroleum Geologists

## ENERGY MINERALS DIVISION

ANNE C. DRAUCKER, President  
DOUGLAS E. WYATT, President-Elect  
WAYNE K. CAMP, Vice President  
BECKY L. KOWALSKI, Secretary  
STEVEN SCHAMEL, Treasurer  
ROBERT A. TREVAIL, Past President

## Councillors

Eastern Section, JOE MORRIS  
Gulf Coast Section, TBD  
Mid-Continent Section, PENG LI  
Pacific Section, TBD  
Rocky Mountain Section, TBD  
Southwest Section, TBD

## International Councillors

Africa, TBD  
Asia/Pacific, BARRY A. GOLDSTEIN  
Canada, JOHN "JOCK" MCCRACKEN  
Europe, TBD  
Latin America, MIQUEL NICHO

## Chairs, Committees

WILLIAM AMBROSE, Coal  
BRIAN CARDOTT, Coalbed Methane  
JEREMY B. PLATT, Energy Economics & Technology  
ART JOHNSON, Gas Hydrates  
URSULA HAMMES, Shale Gas & Liquids  
DEAN ROKASH, Gas (Tight) Sands  
PAUL MORGAN, Geothermal  
JACK PASHIN, Honors & Awards  
FRAN HEIN, Nominations  
SHARLEEN OVERLAND, Oil Sands  
ALAN BURNHAM, Oil Shale  
JACK PASHIN, Publications  
FRAN HEIN, Deputy Editor, NRR  
MICHAEL D. CAMPBELL, Uranium (Nuclear Minerals)  
BRIAN CARDOTT, Website

## DIVISION OF ENVIRONMENTAL GEOSCIENCES

TIM MURIN, President  
STEPHEN TESTA, President-Elect  
KRISTIN CARTER, Vice President  
SEAN KIMIAGAR, Secretary/Treasurer  
MICHELE L. COONEY, Editor  
JEFFREY B. ALDRICH, Past President

## Advisory Board Members

Chair, BRUCE SMITH  
Eastern Section, TIM BASILONE  
Gulf Coast Section, TIMOTHY W. DUEX  
Mid-Continent Section, ERNEST R. MORRISON  
Rocky Mountain Section, DAN W. JACKSON  
Southwest Section, CHRIS LEIBLI  
Pacific Section, ALLEN WAGGONER  
Asia Pacific Region, K. B. TRIVEDI  
Canada Region, FRANCOIS C. MARECHAL  
Europe Region Coordinator, DIRK NIEUWLAND  
Middle East Region, ABDULRAHMAN S. AL-SHARHAN  
Latin America and Caribbean Region, MELISA GALVAN  
At-Large Members, MARK D. LOVELL

## Chairs, Standing Committees

E. CHARLOTTE SULLIVAN, CO2 Sequestration  
LAURIE A. WHITESELL, Environmental Geophysics  
BRUCE D. SMITH, Honors and Awards  
GENE L. MURRAY, Hydrogeology  
BRUCE D. SMITH, Membership  
JEFF PAINE, Nominating  
MICHELE L. COONEY, Publications  
TIM MURIN, Website

## DIVISION OF PROFESSIONAL AFFAIRS

CHANDLER WILHELM, President  
JAMES H. HILL, SR., President-Elect  
WILLIAM "BILL" HASKETT, Vice President  
DEBRA P. OSBORNE, Secretary  
STEVEN M. GOOLSBY, Treasurer  
MICHAEL CANICH, Past President

## Council Members

Eastern Section, JONATHAN M. BRADY,  
JEFFREY R. BRUCE  
Gulf Coast Section, RICHARD W. BALL,  
EVELYN MEDVIN, MARK A. NORVILLE,  
JAMES M. GRUBB, RALPH W. BAIRD  
(PAUL M. BASINSKI)  
Mid-Continent Section, DONALD G. BURDICK,  
DOUGLAS V. DAVIS, JASON HAMILTON  
(JAMES P. KOCHICK)  
Pacific Section, JOHN T. WILLIAMS  
(SARAH D. SALTZER, DOUGLAS A. DRAVES,  
NORMAN C. ROSEN)  
Rocky Mountain Section  
DAVID WAVREK, MARGARET "PEGGY" WILLIAMS  
(JEFFREY "JEFF" W. BRAME)  
Southwest Section, MICHAEL PARTY (MARGO J. LISS)  
Africa Region, BAYO AKINPELU (WASIU ODUFISAN)  
Asia Pacific Region, PETER W. BAILLIE  
(JOHN G. KALDI)  
Canada Region, ROBIN C. MANN  
(DAVID B. OLUTUSIN, MARK S. CHALMERS)  
Europe Region, MOHIT KHANNA (IAIN P. WRIGHT,  
FRANCOIS JEAN GAUTHIER, OLATUNBOSUN OL  
OLAGUNDOYE)  
Latin America and Caribbean Region, FLAVIO JUAREZ  
FEIJO  
Middle East Region, MOUSTAPHA M. R. ELBAZ  
(DAVE L. CANTRELL)

## Chairs, Standing Committees

RICK L. ERICKSEN, Board of Certification  
JAMES HILL, Bylaws Committee  
MARK GALLAGHER, Continuing Education  
JAMES HILL, Conventions  
DAVID HAWK, Governmental Affairs  
MICHAEL CANICH, Awards Committee  
RICHARD FRITZ, Membership  
MICHAEL CANICH, Nominating  
MICHAEL RAINES, Publications  
ELEAZAR BENEDETTO-PADRON, Reserves &  
Resources  
RICK L. ERICKSEN, State Registration  
DIANNA PHU, Website

## AAPG FOUNDATION

### Board of Trustees

JAMES A. GIBBS, Chairman  
JOHN J. AMOROSO, Vice Chairman  
M. RAY THOMASSON, Secretary  
LEE BACKSEN, Treasurer  
LARRY L. JONES, Trustee  
DAVID W. WORTHINGTON, Trustee  
DAVID K. CURTISS, Executive Director  
DAVID LANGE, Deputy Executive Director

## HEADQUARTERS STAFF

**Executive Director:** DAVID K. CURTISS

**Deputy Executive Director:** DAVID E. LANGE

**Director of Science:** TBD

**Director of Innovation & Emerging Trends:**  
SUSAN SMITH NASH

**Managing Director of Global Business:**  
ALAN T. WEGENER

**Director of Administration & Programs:**  
VERN STEFANIC

**Africa Region Programs Manager:**  
DELIA KUYE

**Asia Pacific Programs Manager:**  
ADRIENNE PEREIRA

**European Office Director:**  
JEREMY RICHARDSON

**Latin America and Caribbean Region  
Programs Manager:**  
EMILY SMITH LLINAS

**Middle East and Africa Region Director:**  
ABEER ALZUBAIDI

# AAPG HOUSE OF DELEGATES

Deadline for this section is three months prior to publication.

## OFFICERS

### CHAIR:

**James McGhay**  
(Tulsa, OK)

### CHAIR-ELECT:

**David Entzinger**  
(Midland, TX)

### SECRETARY/EDITOR:

**Kristie Luchtel Ferguson**  
(Tulsa, OK)

### DELEGATES

\*Group Chair

### ABILENE

T. J. Hunt

### AFRICA

A. Adesida  
W. Bosworth  
F. Medina  
G. E. Odior  
L. Olaka  
K. B. Trivedi

### ALABAMA

D. Hills

### ALASKA

TBD

### ALBUQUERQUE (NM)

S. P. Cooper  
M. A. C. Rogers  
D. Ulmer-Scholle

### APPALACHIAN (WV)

E. M. Rothman

### ARDMORE (OK)

M. D. Allison

### ASIA-PACIFIC

A. Bachtar  
P. W. Baillie  
H. Darman  
K. A. U. R. Ghori  
E. A. Ginal-Cumblidge  
P. D. Grant  
K. Hoshi  
W. S. Houston  
C. Jia  
J. G. Kaldi  
J. J. Lambiase  
M. McWalter  
C. A. Oglesby

### AUSTIN (TX)

D. B. Dunlap  
P. R. Rose  
S. A. Tiller  
S. W. Tinker

### BATON ROUGE (LA)

TBD

### CANADA

P. Bauman  
S. Bend  
M. L. Blair

D. E. Brown

R. M. Dicks  
P. J. English  
M. D. Griffi  
A. C. Hargreaves  
R. T. Lemiski  
F. C. Marechal  
D. A. D. Scott  
G. D. Wach

**COAST (CA)**  
J. T. Williams  
**CORPUS CHRISTI (TX)**  
D. O. Moore

**DALLAS (TX)**  
M. E. Bengtson  
C. Blair

**EL PASO**

R. Langford

### EUROPE

J. Casacao  
D. R. Cook  
G. D. Couples  
J. Craig

**H. CROMIE**

K. Gerdes

C. A. Hamilton

B. Horsfield

K. H. Jakobsson

S. Johnsen

I. A. Kjorlaug

P. R. Krois

R. Kudrewicz

P. A. Kukla

I. Le Nir

A. Nemeth

N. Pimentel

M. Rye-Larsen

N. Scarselli

C. Speh

### EVERGLADES (FL)

D. F. Kluesner

### FORT SMITH (AR)

T. M. Shields

### FORT WORTH (TX)

J. Dugan

TBD - 3

### FOUR CORNERS

J. Corken

### GEORGIA

D. Bulger

### GRAHAM (TX)

C. L. Craig

### GRAND JUNCTION (CO)

H. E. Schoenstein

### HOUSTON (TX)

J. Allen

R. Archer

R. J. Ardell

L. B. Backsen

S. M. Barber

K. C. Bennett

S. H. Brachman

J. Burton

D. M. Butler

M. M. Cassidy

M. Cisar

G. Coburn

C. Desforges

C. M. Dingler

L. G. Eubanks

M. Faber

K. Frederick

S. L. Getz

T. Y. Ghazi

G. M. Gillis

L. K. Goetz

P. T. Gordon

J. M. Grubb

P. F. Hoffman

I. Immega

M. Jones

J. E. Jordan, Jr.

A. Kahn

B. J. Katz

R. Laidacker

S. D. Levine

W. Matthews

E. A. Medvin

R. B. Meers

B. Milne-Andrews

D. M. Moore

A. L. Parsons

R. E. Pledger

J. V. Richards

W. C. Riese

D. K. Sacrey

P. A. Santogrossi

S. G. Stanley\*

C. K. Steffensen

C. A. Sternbach

J. W. Tucker

J. Vandenberg

M. S. Winsten

### IDAHO

D. H. Hawk

### ILLINOIS

H. E. Leetaru

### INDIANA

R. I. Walker

### INDIANA-KENTUCKY

J. T. Smith

### KANSAS

D. Davis

E. Morrison

### KENTUCKY

P. J. Gooding

### LAFAYETTE (LA)

T. A. Helms

G. K. P. Munson, Jr.

### LATIN AMERICA &

CARIBBEAN

V. Abreu

K. Bayer

S. Brandon

C. Griffith

E. Hernandez

H. Krause

P. Marshall

F. Monroy-Santiago

R. M. Portas

F. M. Seminario

### LOS ANGELES (CA)

D. D. Clarke

T. Gross

### MICHIGAN BASIN

W. B. Harrison, III

P. J. Voice

### MIDDLE EAST

S. Al-Hajri

S. Al-Mahrouqi

H. Al-Otaibi

R. Kuchinski

### MISSISSIPPI

M. N. Birdwell

### MISSOURI

TBD

### MONTANA

M. Millard

### NEBRASKA

C. Fielding

### NEVADA

B. Ehni

### NEW MEXICO

TBD

### NEW ORLEANS

A. H. Johnson

E. C. McDade

W. M. Whiting\*

### NEW YORK

S. A. Epstein

S. Loewenstein

### NORTH DAKOTA

J. M. Levy

### NORTH TEXAS

C. Reynolds

### NORTHERN CALIFORNIA

D. W. Lewis

R. G. Lindblom

### NORTHERN OHIO

TBD

### NORTHWEST (OR/WA)

J. M. Armentrout

L. B. Thompson

### OHIO

P. L. Archer

### OKLAHOMA CITY

J. A. Alberts

D. G. Campbell

T. L. Hollrah

L. W. Holman, II

S. A. Ladner

M. W. Smith

### PANHANDLE (TX)

J. F. O'Connell

### PITTSBURGH (PAPG)

M. A. Jarvis

### PITTSBURGH (PGS)

D. A. Billman

A. A. Reynolds

### ROCKY MTN. (CO)

S. Adams

J. Birdwell

P. Bucknam

C. E. Campbell

J. J. Cuzella

S. M. Goolsby

J. E. Harris

L. A. M. Johnson

S. G. Kirkwood

G. Mcclave

R. K. Lewis

R. R. Ray

A. Steinle

R. Sullivan

R. L. Swank

### ROSWELL (NM)

TBD

### SACRAMENTO (CA)

S. T. Hector

### SAN ANGELO (TX)

B. Swartz

### SAN JOAQUIN (CA)

A. C. Draucker

C. A. Huggins

L. C. Knauer

### SHREVEPORT (LA)

TBD

### SOUTH TEXAS

J. Casiano

K. Helm

A. Smith

### SOUTHEASTERN (FL)

TBD

### TULSA (OK)

R. Fritz

N. J. Hyne

K. L. Luchtel Ferguson

S. Matson

### UTAH

C. D. Morgan

### WASHINGTON (DC)

J. F. Allan

C. Doolan

C. Enomoto

### WEST TEXAS

S. Burke

D. Entzinger

J. Gamrod

M. Raines

### WYOMING

L. D. W. George

M. D. Peterson