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RESOURCES TECHNOLOGY CONFERENCE



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The integrated event for unconventional resource teams

2019 CONFERENCE ANNOUNCEMENT

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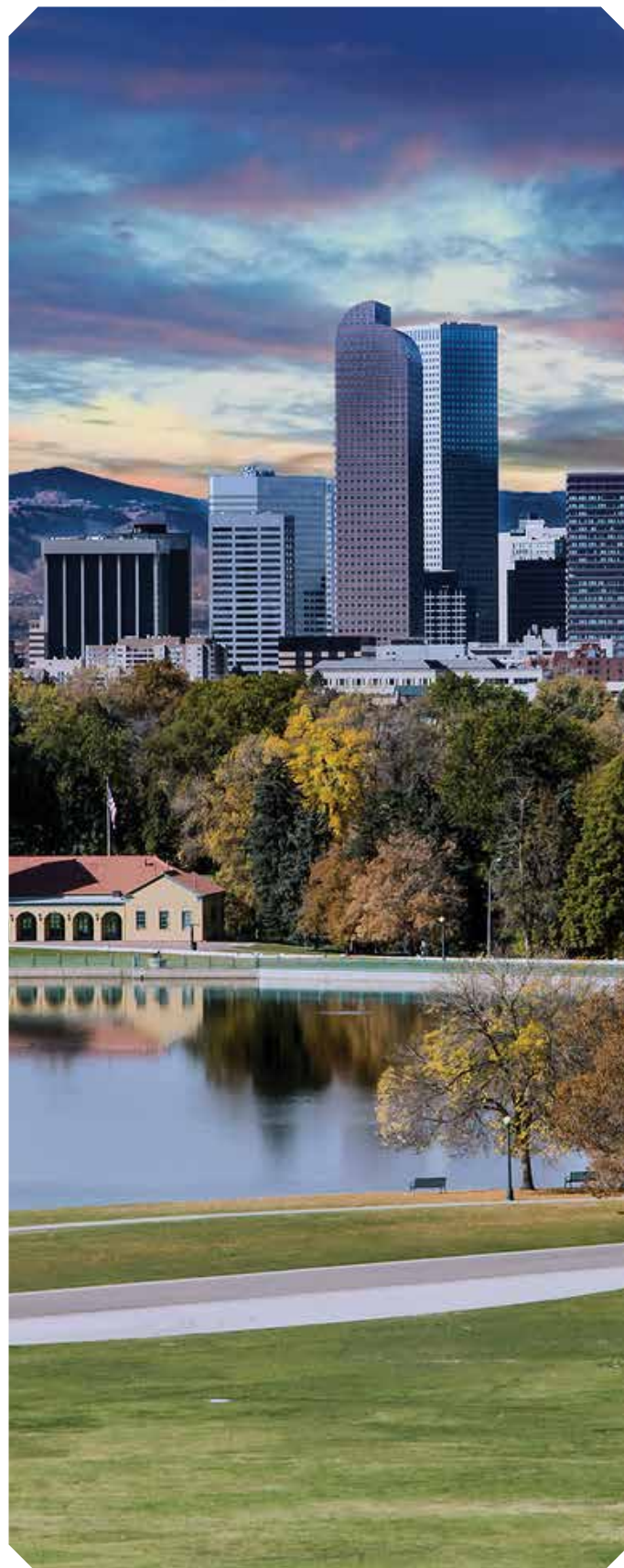
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YOU'RE INVITED – LETTER FROM THE CHAIRS

Dear Colleagues,

On behalf of the 2019 Unconventional Resources Technology Conference (URTeC), its Sponsoring and Endorsing Organizations, and our Technical Program Committee, we welcome you to the seventh edition of URTeC, the preeminent global collaboration event in unconventional resources. Last year, URTeC exceeded all expectations with more than 6,000 attendees from all over the world. URTeC has become a true global must-attend event.

This year will feature nearly 400 technical papers focused on collaboration between geology, geophysics, geochemistry, geomechanics, petrophysics, drilling, completion and production engineering, well stimulation, reservoir engineering, midstream operations, HSE, and material science. In addition to the many technical sessions, noteworthy events are also planned such as:

- The Opening Plenary Session, where leaders of our industry will discuss current affairs and their impact on our energy future;
- The Operators' Forum, where operating companies will present solutions to challenging issues;
- Special Sessions from ARMA (American Rock Mechanics Association) addressing geomechanics in modern completions and well construction, the very popular HFTS (Hydraulic Fracture Test Site session) where the latest findings are discussed, and the SPWLA (Society of Petrophysicists and Well Log Analysts) session highlighting the latest in unconventional petrophysics;
- Topical Breakfasts and Luncheons with engaging speakers addressing key challenges and solutions facing our industry;
- Panel discussions addressing emerging technology, artificial intelligence, sustainable development, induced seismicity, well integrity, and what can make shale plays successful.

Our Exhibition Hall features more than 170 companies with the latest in technology to help you safely produce more for less with an eye to environmental stewardship. In addition, the Exhibition Hall will feature selected technical presentations, the core museum, and the U-Pitch forum to connect technology entrepreneurs with potential partners and investors.

The Sponsoring Organizations—the Society of Petroleum Engineers (SPE), the American Association of Petroleum Geologists (AAPG), and the Society of Exploration Geophysicists (SEG)—along with the eight Endorsing organizations, recognize and appreciate that the economic climate over the past few years has greatly affected the exploration and development of unconventional resources, but their potential contribution has never been higher. The technologies developed today to explore and extract unconventional resources will define the hydrocarbon industry of tomorrow.

On behalf of the organizing societies (SPE, AAPG, and SEG), our endorsing organizations (AIChE, AIST, ARMA, ASCE, ASME, SME, SPEE, SPWLA), and the Technical Program Committee, we are pleased to have you participate in URTeC 2019.

Sincerely,
Technical Program Co-Chairs



Jay Stratton (SPE)
Ultra Petroleum



Doug Valleau (AAPG)
*Strategia Innovation and
Technology Advisors*



Scott Singleton (SEG)
*Independence Resources
Management*



TECHNICAL PROGRAM COMMITTEE

TECHNICAL PROGRAM CO-CHAIRS

Jay Stratton, SPE Co-Chair, *Ultra Petroleum*

Doug Valleau, AAPG Co-Chair, *Strategia Innovation and Technology Advisors*

Scott Singleton, SEG Co-Chair, *Independence Resources Management*

THEME CHAIRS

Brian Driskill, *Shell Exploration and Production Company*, Theme 01: Operators' Forum

Rob Hull, *Pioneer Natural Resources*, Theme 01: Operators' Forum

Katerina Yared, *SM Energy*, Theme 02: Advanced Formation Evaluation of Unconventional Reservoirs

Stephanie Perry, *Anadarko*, Theme 02: Advanced Formation Evaluation of Unconventional Reservoirs

Neil Fishman, *PetroLogic Solutions, LLC.*, Theme 03: Geological Characterization of Unconventional Reservoirs

Steve Sonnenberg, *Colorado School of Mines*, Theme 03: Geological Characterization of Unconventional Reservoirs

Andrew Munoz, *Newfield Exploration*, Theme 04: Geophysical Characterization of Unconventional Reservoirs

David Langton, *Devon Energy*, Theme 04: Geophysical Characterization of Unconventional Reservoirs

Ahmad Ghassemi, *University of Oklahoma*, Theme 05: Geomechanics Integration: The Glue between Geoscience and Engineering

Gang Han, *Aramco Services Company*, Theme 05: Geomechanics Integration: The Glue between Geoscience and Engineering

Robert Hurt, *Pioneer Natural Resources*, Theme 05: Geomechanics Integration: The Glue between Geoscience and Engineering

Eric Michael, *ConocoPhillips*, Theme 06: Applied Geochemistry and Basin Modeling for Unconventionals

John Curtis, *GeoMark Research Ltd.*, Theme 06: Applied Geochemistry and Basin Modeling for Unconventionals

Birol Dindoruk, *Shell International Exploration and Production*, Theme 07: Machine Learning, AI, and Big Data in the Digital Oilfield

Randy Pharis, *ExxonMobil/XTO Energy Inc.*, Theme 07: Machine Learning, AI, and Big Data in the Digital Oilfield

Autumn Shannon, *Marathon Oil*, Theme 08: Increasing Recovery Efficiency in Unconventional Plays

Luis Baez, *Shell Exploration and Production Company*, Theme 08: Increasing Recovery Efficiency in Unconventional Plays

Mohan Manohar, *Noble Energy*, Theme 08: Increasing Recovery Efficiency in Unconventional Plays

Dilhan Ilk, *DeGolyer and MacNaughton*, Theme 09: Reserves Estimation and Production Forecasting

Susan Howes, *Subsurface Consultants & Associates, LLC.*, Theme 09: Reserves Estimation and Production Forecasting

Craig Cipolla, *Hess Corporation*, Theme 10: Production Performance of Tight Oil and Gas Reservoirs

George Koperna, *Advanced Resources International, Inc.*, Theme 10: Production Performance of Tight Oil and Gas Reservoirs

Andronikos Demarchos, *Range Resources*, Theme 11: New Materials and Novel Technologies for Unconventionals

Johannes Alvarez, *Chevron*, Theme 11: New Materials and Novel Technologies for Unconventionals

Benin Jeyachandra, *QRI*, Theme 12: Overcoming Gridlock: Unlocking the Midstream Bottleneck

Kyle Richter, *Occidental Petroleum Corporation*, Theme 12: Overcoming Gridlock: Unlocking the Midstream Bottleneck

Ali Sloan, *Parsley Energy*, Theme 13: Emerging Unconventional Plays and Novel Applications of Technology

Ulrich Zimmer, *Shell Exploration and Production Company*, Theme 13: Emerging Unconventional Plays and Novel Applications of Technology

Isaac Aviles, *Schlumberger*, Theme 14: Well Construction Optimization and Best Practices

Matthew Poole, *Shell Exploration and Production Company*, Theme 14: Well Construction Optimization and Best Practices

Pedram Fanailoo, *DNV GL*, Theme 15: License to Operate: Stakeholder Management and Social Performance

Steven Carpenter, *University of Wyoming, Enhanced Oil Recovery Institute*, Theme 15: License to Operate: Stakeholder Management and Social Performance

SUBCOMMITTEE CHAIRS

Baosheng Liang, *Chevron*, Topicals

David Hume, *Independent Consultant*, Topicals

Eric Marshall, *GEODynamics*, Topicals

Alexsandra Martinez, *DeGolyer and MacNaughton*, URTEC Events App

Livia Sivila, *Enervest*, URTEC Events App

Bin Yuan, *University of Calgary*, Exhibit Hall Papers

John Lassek, *Newfield Exploration*, Exhibit Hall Papers

Alejandro Lerza, *Chevron*, Panels and Invited Sessions

Shawn Maxwell, *Newfield Exploration*, Panels and Invited Sessions

Skip Rhodes, *Pioneer Natural Resources*, Plenary Session

Tom Blasingame, *Texas A&M University*, Plenary Session



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CONFERENCE AT A GLANCE (AS OF 11 MARCH)



Purchase your Topical Breakfast and Luncheon tickets during registration.
Tickets are limited and required for admission.

SATURDAY, 20 JULY

12:00p–5:00p	Registration
8:00a–5:00p	Short Course 1: Shale Play Production Facilities (ASME)
8:00a–5:00p	Short Course 2 (Day 1): Frac School (ASME)
8:00a–5:00p	Short Course 3 (Day 1): Seismic Attributes for Resource Plays (SEG)
8:00a–5:00p	Short Course 4 (Day 1): Geophysical Application to Petroleum Engineering (SEG)
8:00a–5:00p	Short Course 5 (Day 1): Shale Gas Geomechanics (AAPG)
8:00a–5:00p	Short Course 6 (Day 1): DFIT—The Unconventional Well Test: Theory, Design, and Interpretation (SPE)
8:00a–5:00p	Short Course 7 (Day 1): Mitigating Bias, Blindness, and Illusion in E&P Decision Making (SPE)
8:00a–5:00p	Short Course 8 (Day 1): Unconventional Reservoir Production (Rate-Transient) Analysis (SPE)
8:00a–5:00p	Short Course 9 (Day 1): Shale and Tight Reservoir Technical Analysis (SPE)

SUNDAY, 21 JULY

9:00a–5:00p	Registration
8:00a–5:00p	Short Course 2 (Day 2): Frac School (ASME)
8:00a–5:00p	Short Course 3 (Day 2): Seismic Attributes for Resource Plays (SEG)
8:00a–5:00p	Short Course 4 (Day 2): Geophysical Application to Petroleum Engineering (SEG)
8:00a–5:00p	Short Course 5 (Day 2): Shale Gas Geomechanics (AAPG)
8:00a–5:00p	Short Course 6 (Day 2): DFIT—The Unconventional Well Test: Theory, Design, and Interpretation (SPE)
8:00a–5:00p	Short Course 7 (Day 2): Mitigating Bias, Blindness, and Illusion in E&P Decision Making (SPE)
8:00a–5:00p	Short Course 8 (Day 2): Unconventional Reservoir Production (Rate-Transient) Analysis (SPE)
8:00a–5:00p	Short Course 9 (Day 2): Shale and Tight Reservoir Technical Analysis (SPE)
8:00a–5:00p	Short Course 10: Recent Advances in Artificial Lift for Shale Plays (ASME)
8:00a–5:00p	Short Course 11: Carbonate Essentials: Pores to Prospect (SEG)
8:00a–5:00p	Short Course 12: Physics and Mechanics of Rocks: A Practical Approach (SEG)
8:00a–5:00p	Short Course 13: Applied Petroleum Geochemistry (AAPG)
8:00a–5:00p	Short Course 14: Applied Statistical Modeling and Data Analytics for Reservoir Performance Analysis (SPE)
8:00a–5:00p	Short Course 15: Managing Your Business Using PRMS and SEC Standards (2018 Update) (SPE)

MONDAY, 22 JULY

6:30a–5:30p	Registration
8:30a–10:00a	Opening Plenary Session
10:00a–7:00p	Exhibition
10:00a–11:00a	Breakfast Bites with Exhibitors
10:30a–12:15p	Technical Sessions – Exhibit Hall
10:45a–12:05p	Panel Session: Sustainable Development Goals for Unconventionals
10:45a–12:05p	Panel Session: Unconventional Play Development—A View from the Front Lines
10:45a–12:05p	Technical Sessions – Session Rooms
12:05p–1:15p	Topical Luncheon: Landscape of the Oil and Gas Industry in Colorado
12:05p–1:15p	Topical Luncheon: Shale Revolution—Is the Party Over?
12:05p–1:15p	Topical Luncheon: Targets, Training, and Technology in the 2020s: Where is Geoscience Headed?
1:45p–3:05p	Panel Session: Value Proposition of Microseismic Mapping of Hydraulic Fractures
1:45p–5:35p	Technical Sessions – Session Rooms
1:45p–5:10p	Technical Sessions – Exhibit Hall
3:00p–4:00p	Refreshment Break
5:00p–7:00p	Opening Reception



TUESDAY, 23 JULY

6:30a–5:30p	Registration
7:00a–8:15a	Topical Breakfast: EOR Technologies for Unconventional Oil Reservoirs
7:00a–8:15a	Topical Breakfast: The Shale Revolution: The Next Phase
8:25a–10:10a	Panel Session: Hydraulic Fracturing and Its Effects on Well Integrity
8:25a–12:15p	Technical Sessions – Session Rooms
9:00a–6:00p	Exhibition
9:40a–12:15p	Technical Sessions – Exhibit Hall
10:00a–11:00a	Refreshment Break
11:00a–12:15p	Panel Session: Recent Experiences with Induced Seismicity
12:05p–1:15p	Topical Luncheon: Increasing Recovery: Basin-Specific Approach and Produced Water
12:05p–1:15p	Topical Luncheon: How to Protect Your Company from Extinction
12:05p–1:15p	Topical Luncheon: Horizontal Drilling in the Permian: A Look at the Objectives
1:45p–5:35p	Special Session: Hydraulic Fracture Test Sites (HFTS)
1:45p–5:35p	Technical Sessions – Session Rooms
1:45p–5:10p	Technical Sessions – Exhibit Hall
3:00p–4:00p	Refreshment Break
5:00p–6:00p	Networking Reception

WEDNESDAY, 24 JULY

6:30a–1:00p	Registration
7:00a–8:15a	Topical Breakfast: Freshwater Neutral—Managing Water Use and Giving Back to the Environment
7:00a–8:15a	Topical Luncheon: Perforating Design Impacts on Hydraulic Fracturing
8:25a–10:10a	Special Session: ARMA—Principles, Simulation, and Practice
8:25a–10:10a	Special Session: Scratching the Surface: Midstream Challenges and Logistics Solutions in the Permian
8:25a–12:15p	Technical Sessions – Session Rooms
9:00a–1:00p	Exhibition
9:40a–12:15p	Technical Sessions – Exhibit Hall
10:00a–11:00a	Refreshment Break
11:00a–12:15p	Panel Session: Next Technology Frontier in Unconventionals—What’s Needed Versus What’s in Development
12:05p–1:15p	Topical Luncheon: Politics, Policies, and Passion: Lessons from Colorado
12:05p–1:15p	Topical Luncheon: Seismicity in Texas—What We’ve Learned from the First 3 Years of TexNet-CISR Monitoring and Research
12:05p–1:15p	Topical Breakfast: The Role of Technology in Driving Down Unconventional Reservoir Cost-of-Supply— Historical Results and Future Projections
1:45p–3:30p	Panel Session: Data Analytics Update for Unconventionals—What’s Missing?
1:45p–3:30p	Special Session: Best of SPWLA
1:45p–3:30p	Technical Sessions – Session Rooms

THURSDAY, 25 JULY

8:00a–5:00p	Field Trip: Unconventional Petroleum Reservoirs, Wattenberg Field Area, Northern Front Range (RMAG)
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Visit URTeC.org/2019 for updates.



CONFERENCE HIGHLIGHTS

● MONDAY ●

● TUESDAY ●

● WEDNESDAY ●

● 2019 URTeC APP AND AWARDS ●

● SHORT COURSES ●

● FIELD TRIP ●

● NETWORKING OPPORTUNITIES ●

MONDAY CONFERENCE HIGHLIGHTS



Purchase your Topical Breakfast and Luncheon tickets during registration. Tickets are limited and required for admission.

Opening Plenary Session

Time: 8:30a–10:00a

Moderators: **Tom Blasingame** (Texas A&M University)
Skip Rhodes (Pioneer Natural Resources)

The landscape of unconventional in North America has some unknowns, but is reasonably well-mapped (e.g., the Delaware and Midland Basins, the Bakken, the Niobrara-Codell, the Eagle Ford, etc.). The struggle for profitability continues, but there can be little argument that technical success can be achieved through careful geological targeting and tailored stimulation. This year's URTeC Executive Plenary considers the roles of legacy unconventional operators, as well as operators who are play-focused (or even intra-play focused).

Speakers include:

- **Mike Henderson**, Senior Vice President, Marathon Petroleum Corporation
- **Clay Gaspar**, President, WPX Energy

MONDAY PANEL SESSIONS

Sustainable Development Goals for Unconventionals

Time: 10:45a–12:05p

It can work! We can achieve a sustainable balance between oil and gas and other energy sources to accommodate an energy-thirsty world, while ultimately consciously lifting the global standard of living with minimal costs to our ecosystem.

The oil and gas industry plays a key role in the global energy system and as such, it is a key driver of social and economic development. This panel will discuss various aspects of where the oil and gas industry can impact and develop global sustainable development goals (SDGs), including community investment and development, emissions mitigation, ecosystem management, and supply chain sustainability, among others. This panel discussion aims for a panoramic view of our current energy resources and how we can use the bright minds at hand in our industry to make this world a better place for everyone "touched" by energy in one way or another, today and for the future generations to come.

Invited panelists include:

- **Denise Cox** (President of Storm Energy LTD)
- **Ray Leonard** (President of Anglo Eurasia LLC, AAPG)
- **Linda Battarola** (Colorado School of Mines, SPE)

Unconventional Play Development—A View from the Front Lines

Time: 10:45a–12:05p

Moderators: **Steph Perry** (Anadarko Petroleum Corporation),
Tom Blasingame (Texas A&M University)

This panel brings the "field commanders" from the various "hot" shale plays to discuss their strategies, their activities, their successes, and their challenges. These are people who make development, completion, and operational decisions every day. This panel will provide orientation through short presentations, but also have a facilitated discussion sequence.

Panelists will include:

- **Chad McAllister**, Vice President-Permian, Anadarko
- **Dave Cannon**, Vice President-Geoscience, Diamondback Representatives from the Eagle Ford, SCOOP/STACK, and Bakken plays

Value Proposition of Microseismic Mapping of Hydraulic Fractures

Time: 1:45p–3:05p

Moderator: **Julie Shemeta** (MEQ Geo Inc)

A panel of technology advocates within oil and gas operating companies will discuss the benefits and limitations of applying microseismic monitoring. Panelists including engineers, geologists, and geophysicists representing mid-size to major oil companies will provide a critical look at the application and interpretation of microseismicity with special attention on the value proposition of the technology.

MONDAY TOPICAL LUNCHEONS

Time: 12:05p–1:15p

Location: Colorado Convention Center

Fee: \$60 per person



Landscape of the Oil and Gas Industry in Colorado

Congressman Ken Buck, U.S. Member of Congress, 4th Congressional District of Colorado

The 4th Congressional District is home to 14 oil and gas producing counties supporting approximately 93% of Colorado's oil and gas output. Colorado voters, especially in the 4th District, rejected Proposition 112 and its onerous regulations because the heavy-handed, one-size-fits-all proposal works against Colorado's economy and prosperity. Going forward, we can expect more localized efforts to thwart energy development and continue pushing the Green New Deal. Coloradans know what's at stake and they understand the importance of the industry to our state's economic well-being.



Shale Revolution—Is The Party Over?

Mike Wichterich, Chief Executive Office, Three Rivers Operating Company IV

In the past 12 months Wall Street Investors have turned their backs on Upstream Energy Companies. What does this mean to both Public and Private Equity Backed Companies?



Targets, Training, and Technology in the 2020s: Where is Geoscience Headed?

Rob Stewart, Director, Allied Geophysical Labs; **Hugh Roy** and **Lillie Cranz Cullen Distinguished University Chair in Exploration Geophysics**; **President Elect, SEG**

Geoscience, which encompasses both geology and geophysics, has several key challenges in the decade ahead, particularly in the unconventional arena. Among those challenges are the fact that unconventional plays are run more like production factories, which by its very definition minimizes the role of geoscience. We are challenged to drive the point home that mudrocks are not homogeneous and well drilling programs benefit greatly from targeting of laterals. We also face rapid technological advancements and the retirement of a large body of experienced geoscientists. How we meet these challenges in the decade ahead will determine if our discipline is able to survive.

TUESDAY CONFERENCE HIGHLIGHTS



Purchase your Topical Breakfast and Luncheon tickets during registration.
Tickets are limited and required for admission.

TUESDAY TOPICAL BREAKFASTS

Time: 7:00a–8:15a
Location: Colorado Convention Center
Fee: \$40 per person



EOR Technologies for Unconventional Oil Reservoirs

Ganesh Thakur, *Director, Energy Industry Partnership & Distinguished Professor, University of Houston*

Unconventional resources have transformed the landscape of the oil and gas industry in the USA and the world. The primary recovery from these oil reservoirs is predicted to be in the range of 2 to 8%, so EOR is essential to improving the recovery factor. A review of the IOR/EOR indicates that most of the EOR studies have been limited to experimental investigations and numerical simulation. Moreover, the research reveals that miscible gas injection is the most promising method among the EOR techniques. Experimental studies show that CO₂ injection has the highest potential of improved recovery followed by produced gas followed by surfactant. Further research and field trials are necessary to bridge the gap and improve the scaling from laboratory to field. Some ideas for future research are identified to improve the understanding of the complex mechanisms of EOR in unconventional oil reservoirs.



The Shale Revolution: The Next Phase

Gary Sernovitz, *Managing Director, Lime Rock Management*

The next phase of the U.S. shale revolution is vital due to the implications for the E&P and oilfield service industry, the environment, and America's place in the world. Will the U.S. shale producers live up to their much-discussed production potential, or will events conspire to slow them down?

TUESDAY TOPICAL LUNCHEONS

Time: 12:05p–1:15p
Location: Colorado Convention Center
Fee: \$60 per person



Increasing Recovery: Basin-Specific Approach and Produced Water

Elena Melchert, *Director, Upstream Research Division Office of Oil and Gas, Office of Fossil Energy, U.S. Department of Energy*

Update of the Department of Energy (DOE) onshore research portfolio and recent advances in improving recovery of oil and gas from unconventional (shale) resources including activities related to produced water. Briefly describes new technology for increasing ultimate recovery, focusing on field sites, fundamental shale studies, and data-driven approaches, including technologies, particularly sensing and data analytics approaches, sponsored by DOE.



How to Protect Your Company from Extinction

M. J. Clark, *Integrated Leadership Systems, Senior Leadership Consultant*

Business success is not just about crunching numbers. It's about developing others; working on the business, not just in it; building trust; and giving Millennials and Gen Z employees the tools and empowerment to successfully lead your department or company.

M. J. Clark's interactive session will provide researched principles and suggestions you can implement immediately to help you build a roadmap to avoid extinction and ensure a successful business future.



Horizontal Drilling in the Permian: A Look at the Objectives

J. Michael Party, *President, Beryl Oil and Gas LP*

The Wolfcamp, Spraberry, and Bone Spring zones have been talked about in considerable detail, from numerous conferences to company presentations, specifically as to where to land the horizontal and why these zones have become the main focus of horizontal drilling in the Permian Basin today. This talk will discuss a few interesting aspects of these zones but will look at numerous other zones that have been targeted by horizontal drilling over the years in the Permian Basin.

TUESDAY SPECIAL SESSION

Hydraulic Fracture Test Sites

Time: 1:45p–5:35p

The Hydraulic Fracturing Test Sites (HFTS) are field-based research experiments conducted in the West Texas Midland and Delaware basins, bringing together government and industry to improve recovery, continue enhancing environmentally responsible methods of optimizing production, and lowering costs in the Midland and Delaware Basins. Experiments at both the Midland HFTS1 and Delaware HFTS2 involve drilling, hydraulically fracturing, and monitoring multiple horizontal wells operated by host companies Laredo Petroleum and Anadarko, respectively. Coring a slant well through the stimulated rock volume is part of both projects. Approximately 600 feet of core were successfully recovered in HFTS1; slant coring at HFTS2 is scheduled for Q3/Q4 of 2019. The value of each project is roughly \$25 million.

Although hydraulic fracturing in unconventional is a standard practice, optimizing well spacing and completion design remains a challenge especially in areas with the potential for multiple vertical landing zones. HFTS1 and HFTS2 seek to address these issues through the collection and integration of geological, geochemical, geophysical, geomechanical, petrophysical, drilling, and completions data with a multi-well instrumentation and time-lapse geochemistry program. The project will advance hydraulic fracturing technology, optimize well spacing, and mitigate environmental impacts of shale development operations. The research will advance understanding of the hydraulic fracturing process in shale reservoirs, enabling the design and execution of effective fracture treatments that significantly contribute to production. Improved design and execution of fracture stages will also reduce the number of future infill wells drilled and reduce water volume and energy input. The ultimate goal for producers is an understanding of how to optimize parameters to meet individual internal performance metrics.

Presentations will include:

- **Natural Fracture Characterization in the Wolfcamp Formation at the Hydraulic Fracture Test Site (HFTS), Midland Basin, Texas:** J. F. W. Gale, S. J. Elliott, J. Z. Li, S. E. Laubach (University of Texas at Austin)
- **Analysis and Interpretations of Pressure Data from the Hydraulic Fracturing Test Site (HFTS):** T. Li, W. Chu, P. A. Leonard (Pioneer Natural Resources)
- **Seismic Monitoring at the Hydraulic Fracturing Test Site (HFTS), Midland Basin, Texas:** A. Kumar¹, H. Hu², R. Hammack¹, A. Bear³, W. Harbert³ (1. National Energy Technology Laboratory; 2. Department of Earth and Atmospheric Sciences, University of Houston; 3. National Energy Technology Laboratory/Department of Geology and Environmental Science, University of Pittsburgh)

TUESDAY/WEDNESDAY CONFERENCE HIGHLIGHTS

TUESDAY PANEL SESSIONS

Hydraulic Fracturing and its Effects on Well Integrity

Time: 8:25a–10:10a

Moderator: Terry Palisch (Carbo Ceramics)

As the industry has pushed the envelope on drilling longer horizontal laterals with an ever-increasing number of stages, clusters, proppant, and fluid volumes in unconventional, there has been an associated increase in the reports of well deformations and failures leading to partial or complete restrictions in the lateral. Early reports suggested these might be limited to select unconventional plays; however, it now appears that most, if not all, unconventional plays experience these issues. There are many potential contributing causes for this phenomenon—often rooted in the completion design, the well design, or the geomechanics of the play—but these deformations and failures present increasing challenges to the industry including lost production, inoperable wells, and the inability to work in some or all of the lateral. While there is much work to be done to achieve remediation and/or mitigation of the well deformations and failures seen in unconventional, this panel will focus on the extent of the challenge, potential causes, and potential efforts to address this issue. In addition, the goal of the panel is to provide a forum for open discussion on the topic from all attendees.

Recent Experiences with Induced Seismicity

Time: 11:00a–12:15p

Moderators: Hal Macartney and Shawn Maxwell

A panel of industry representatives will discuss the latest issues associated with injection induced seismicity. While seismicity associated with waste water disposal has begun to be successfully mitigated in Oklahoma and Kansas, attention has begun to focus on the Permian basin. Meanwhile, seismicity associated with hydraulic fracturing continues as a regulatory issue.

Panelists will include representatives from a regulatory body, academia, and an operating company.

WEDNESDAY TOPICAL BREAKFASTS

Time: 7:00a–8:15a

Location: Colorado Convention Center

Fee: \$40 per person



Freshwater Neutral—Managing Water Use and Giving Back to the Environment

Karen Olson, Technology Director, Southwestern Energy

This SPE Distinguished Lecture presentation is focused on highlighting the challenges encountered, lessons learned, and best practices companies can implement in their efforts to be better stewards of freshwater resources.

In early 2013, a small multi-discipline team closely evaluated all elements within the operational water life cycle and identified cost-competitive ways to optimize the company's freshwater usage.

Although the processes dramatically reduced freshwater requirements by up to 30% in some operating areas and saved the company more than \$20 million dollars, another factor was required in order to completely offset the need for the remaining freshwater use.

Thus, investment in conservation projects was implemented to improve freshwater resources within basins where operations occurred, achieving freshwater neutral required improvements in everyday work practices and a change in the mindset of water management across the company.



Perforating Design Impacts on Hydraulic Fracturing

Steve Baumgartner, Senior Engineering Technical Advisor, GEODynamics, Inc.

The presentation will cover perforating techniques and designs, and how they affect hydraulic fracturing in horizontal well completions. Examples of limited entry designs and the fracture diagnostic tests used to evaluate perforating designs will be presented. Current and emerging perforation technologies will be discussed. Case histories comparing different perforating designs and techniques will be presented.

WEDNESDAY SPECIAL SESSIONS

ARMA—Principles, Simulation, and Practice

Time: 8:25a–10:10a

Chair: John McLennan (University of Utah)

ARMA is the American Rock Mechanics Association. Membership includes specialization in all forms of surface and subsurface rock engineering—from tunneling to mine design to hydraulic fracturing to subsidence and compaction assessment. Membership is international, with members from 37 nations.

This session provides new insights from four senior researchers and practitioners. The theme of the session is application of rock mechanics principles, measurements, and simulations to characterize, comprehend, and exploit in-situ mechanical properties, discontinuities, stresses, and treatment parameters. These premier practitioners offer perspectives from national laboratories, industry, and academia.

- **Andrew Bunger**, Associate Professor and R.K. Mellon Faculty Fellow in Energy, University of Pittsburgh Department of Civil and Environmental Engineering and Department of Chemical and Petroleum Engineering: Implications of Experiments and Simulations for the Multi-Objective Optimization of Horizontal Well Completions

Co-authors: Cheng Cheng, Delal Gunaydin (University of Pittsburgh); Anthony Peirce (University of British Columbia)

- **Dave Cramer**, Senior Engineering Fellow—Completions, ConocoPhillips: The Role of Perforations in Balancing Stress Variations Along the Lateral During Plug-and-Perf Treatments
- **Robert Hurt**, Staff Engineer, Geomechanics, Pioneer Natural Resources Company: SRV Versus Hydraulic Fracture Geometry: Are Mixed-Mode Fractures the Missing Link?
- **Jack Norbeck**, Co-founder and Chief Technology Officer at Fervo Energy: Mixed-Mechanism Stimulation in Geothermal Reservoirs

Scratching the Surface: Midstream Challenges and Logistics Solutions in the Permian

Time: 8:25a–10:10a

Co-Chairs: Kyle Richter (OXY) and Benin Jeyachandra (Schlumberger)

Innovation isn't just for the subsurface, and URTEC 2019 brings a renewed focus on midstream and facilities challenges via Theme 12, "Overcoming Gridlock: Unlocking the Midstream Bottleneck." This invited session within the theme will explore the latest technologies and business strategies for gas compression, pipeline operation, and water logistics. Without these important midstream drivers, the Permian is just another basin all dressed up with no place to go.

WEDNESDAY CONFERENCE HIGHLIGHTS



Purchase your Topical Breakfast and Luncheon tickets during registration.
Tickets are limited and required for admission.

WEDNESDAY SPECIAL SESSIONS

Best of SPWLA

Time: 1:45p–3:30p

Co-Chairs: **Sam Fluckiger** (SM Energy) and **Peter Kaufman** (QEP Resources)

The Society of Petrophysicists and Well Log Analysts (SPWLA) is a non-profit organization dedicated to the advancement of petrophysics, log and core measurements, formation evaluation techniques, and hydrocarbon, mineral, and water resources. The SPWLA is pleased to showcase a selection of top-rated unconventional reservoir-focused papers presented at its 60th Annual Symposium June 2019. The papers will highlight new technologies and techniques that are designed for the specific issues faced by operators in tight oil/gas formations and shale-rich formations.

WEDNESDAY PANEL SESSIONS

Next Technology Frontier in Unconventionals—What's Needed Versus What's in Development

Time: 10:55a–12:15p

Confirmed Panelists:

- **Mathis Lee**, IOR Tight Rock Unit Manager at Chevron Energy Technology Company
- **Fred Wasden**, iShaleTM Project Manager at Shell
- **Erdal Ozkan**, Director of Unconventional Reservoir Engineering Project (UREP) Consortium, Colorado School of Mines
- **Jon Ludwig**, President and Founder of Novi
- **Sidd Gupta**, Co-founder and Chief Executive Officer of Nesh

The shale revolution was conceived thanks to the developments in technology that allowed drilling and completion of wells capable of producing oil and gas at economic rates from ultra-low permeability reservoirs. Through the years, industry and technology has focused on drilling longer wells, pumping more sand, and increasing the number of frac stages per well. This panel gathers industry experts to discuss the different perceptions on the next technology breakthrough required for unconventional, and contrast it against the actual focus of technology development

Data Analytics Update for Unconventionals—What's Missing?

Time: 1:45p–3:30p

Moderator: Alejandro Lerza (Chevron)

Panelists:

- **Mariano Gurfinkel**, Manager Advanced Analytics at Marathon Oil Corporation
- **Sebastien Matringe**, Manager of Reservoir Optimization and Analytics at Newfield Exploration
- **Srikanta Mishra**, Institute Fellow and Chief Scientist at Batelle
- **Patrick Rutty**, Senior Product Manager at Drillinginfo
- **Jose Contreras**, Technology Lead at Baker Hughes

This panel gathers industry experts from operator, service companies, and the academia to present their view of the current status of data analytics in the oil and gas industry, followed by an in-depth discussion on what else is being done and/or should be done on this subject within the industry.

WEDNESDAY TOPICAL LUNCHEONS

Time: 12:05p–1:15p

Location: Colorado Convention Center

Fee: \$60 per person



Politics, Policies, and Passion: Lessons from Colorado

Dan Haley, President and Chief Executive Officer, Colorado Oil & Gas Association

For the past several years, Colorado has been the epicenter of a fight over responsible oil and natural gas production as out-of-state activists and outside money have pushed local bans on hydraulic fracturing and an extreme statewide setback. In 2018, Colorado voters rejected the 2,500-foot setback measure but efforts continue to regulate and restrict the industry. The lessons learned in Colorado are becoming more applicable across the country. In this session, you will find out what industry has done in Colorado to try and create a more stable and predictable political and regulatory environment



Seismicity in Texas—What We've Learned from the First 3 Years of TexNet-CISR Monitoring and Research

Peter Hennings, Research Scientist and Lecturer Principal Investigator, Center for Integrated Seismicity Research, Texas Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas

The new TexNet Seismic Monitoring network recorded 3676 earthquakes in Texas in 2018 with 385 being of magnitude ($ML \geq 2.0$). The rate of seismicity, independent of enhancements to monitoring, has decreased in the Fort Worth Basin, increased in the Eagle Ford play area, and increased significantly in west Texas, especially in the Delaware Basin. Each seismically-active area has unique geological characteristics and operational influences that need to be understood as the hazard is characterized and effective mitigation measures are sought. The Texas Bureau of Economic Geology's TexNet-CISR public and industry partnership has established a broad portfolio of research and monitoring projects to address this key emerging topic.



The Role of Technology in Driving Down Unconventional Reservoir Cost-of-Supply—Historical Results and Future Projections

Greg Leveille, Chief Technology Officer, ConocoPhillips

As recently as ten years ago, unconventional reservoirs were believed by the majority of E&P industry participants to be marginal targets—destined to deliver single digit recovery factors and being unable to compete against conventional reservoirs on cost of supply. History has proven that this view was horribly pessimistic, with technological advancements and innovative approaches having propelled unconventional to the top of almost every North American E&P company's portfolio. This talk will discuss the main drivers behind this remarkable transformation and will also look towards what the future may hold regarding further improvements, both from traditional E&P technologies as well as from data analytic and digital solutions.

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NEW IN 2019: URTEC AWARDS ***Make Your Vote Count – Help URTeC Select the Best of the Best***

Use the URTeC App to help select the top 16 papers of 2019. Awardees will be recognized on the URTeC website and 2020 Program Book.

SHORT COURSES

Please visit URTeC.org for all details, policies, and important notes regarding Short Courses.

	Title	Instructors	Date(s)/Time(s)	Fees
1	Shale Play Production Facilities (ASME)	Kyle Richter (ASME) and Stuart Scott (ASME)	Saturday, 20 July 8:00a–5:00p	Professionals \$795 / Students \$150
2	Frac School (ASME)	Kyle Richter (ASME) and Stuart Scott (ASME)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professionals \$1,395 / Students \$300
3	Seismic Attributes for Resource Plays (SEG)	Kurt Marfurt (Professor of Geosciences, University of Oklahoma)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professionals \$1,145 / Students \$300
4	Geophysical Application to Petroleum Engineering (SEG)	Peter Bartok (Professor of Geology at University of Houston, Petroskills Instructor and Petroleum E&P Consultant)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professionals \$1,145 / Students \$300
5	Shale Gas Geomechanics (AAPG)	Hamed Soroush (Global Geomechanics Director, PETROLERN Engineering and Geosciences Advisors)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professionals \$1,295 / Students \$300
6	DFIT - The Unconventional Well Test: Theory, Design, and Interpretation (SPE)	David P. Craig (Director Stimulation Design, Oxy)	Saturday-Sunday, 20-21 July, 8:00a–5:00 p	Professional Members \$1,400 and Professional Non-Members \$1,800 / Students \$500
7	Mitigating Bias, Blindness, and Illusion in E&P Decision Making (SPE)	Creties Jenkins (Partner, Rose and Associates)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professional Members \$1,400 and Professional Non-Members \$1,800 / Students \$500
8	Unconventional Reservoir Production (Rate-Transient) Analysis (SPE)	Chris Clarkson (Professor and the Encana-AITF Chair, Unconventional Gas and Light Oil Research)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professional Members \$1,400 and Professional Non-Members \$1,800 / Students \$500
9	Shale and Tight Reservoir Technical Analysis (SPE)	Steve Hennings (Principal, Source Rock Engineering)	Saturday-Sunday, 20-21 July, 8:00a–5:00p	Professional Members \$1,400 and Professional Non-Members \$1,800 / Students \$500
10	Recent Advances in Artificial Lift for Shale Plays (ASME)	Kyle Richter (ASME) and Stuart Scott (ASME)	Sunday, 21 July 8:00a–5:00p	Professionals \$795 / Students \$150
11	Carbonate Essentials: Pores to Prospect (SEG)	Christopher Liner (Professor, University of Arkansas)	Sunday, 21 July 8:00a–5:00p	Professionals \$685 / Students \$150
12	Physics and Mechanics of Rocks: A Practical Approach (SEG)	Manika Prasad (Colorado School of Mines)	Sunday, 21 July 8:00a–5:00p	Professionals \$325 / Students \$100
13	Applied Petroleum Geochemistry (AAPG)	Richard Patience (Houston Representative, Applied Petroleum Technologies) & Joe Curiale (Petroleum Geochemist, Geochemical Advisory Services)	Sunday, 21 July 8:00a–5:00p	Professionals \$695 / Students \$150
14	Applied Statistical Modeling and Data Analytics for Reservoir Performance Analysis (SPE)	Srikanta Mishra (Institute Fellow and Chief Scientist (Energy), Battelle Memorial Institute)	Sunday, 21 July 8:00a–5:00p	Professional Members \$750 and Professional Non-Members \$950 / Students \$300
15	Managing Your Business Using PRMS and SEC Standards (2018 Update) (SPE)	Joshua, Oletu, (Principal Advisor at Gaffney, Cline & Associates)	Sunday, 21 July 8:00a–5:00p	Professional Members \$750 and Professional Non-Members \$950 / Students \$300

Important notes regarding Short Courses and Field Trip:

- Short courses and the field trip are limited in size and are reserved on a first come, first served basis and must be accompanied by full payment.
- If you do not plan to attend the conference, a \$30 enrollment fee will be added to the short course and/or field trip fee upon registering. (This fee can be applied to a full-conference registration should you change your mind later.)
- A wait list is automatically created when a short course or field trip sells out. URTeC Show Management will notify you if you are on a wait list and space becomes available.
- Before purchasing non-refundable airline tickets, confirm the short course and/or field trip will take place as some may be cancelled if undersubscribed.
- Please register well before 6 June 2019 to help guarantee your spot. Short course and field trip cancellations will be considered at this time—no refunds will be accepted for cancellations after this date.
- URTeC Show Management will continue to take registrations for short courses and the field trip that are not cancelled up until they are sold out or closed.
- Field trip participants should expect an email from the Field Trip leader approximately 2-3 weeks prior with an itinerary including details of meeting points, transportation, phone numbers, hotels as well as what type of supplies and clothing is necessary.
- AAPG, the sponsoring organizations, field trip leaders and their employers do not maintain insurance covering illness or injury for individuals.

Students: There are a limited number of discounted registrations available for short courses and field trips. Discounted registrations are on a first come, first served basis with full payment. If a discounted space is still available, it will show up during the online registration process. If discounted spots are no longer available, you may register at the full fee; if we are able to add additional discounted spots we will refund the difference at that time.

FIELD TRIP



Unconventional Petroleum Reservoirs, Wattenberg Field Area, Northern Front Range

Date: Thursday, 25 July
Field Trip Leader: **Steve Sonnenberg**, *Professor and Boettcher Chair in Petroleum Geology, Director/PI MUDTOC Consortium, Colorado School of Mines*
Sponsored by: Rocky Mountain Association of Geologists (RMAG)
Time: 8:00a–5:00p
Location: Departs from Colorado Convention Center (B Lobby)
Cost: \$575 per person | Includes Field Trip Guidebook, transportation, and lunch

Examples of unconventional petroleum reservoirs are well exposed in outcrops along the Front Range of Colorado. This one-day field trip will examine several types of unconventional petroleum systems including tight gas, tight oil, fractured reservoirs, heavy oil, and tar sands. Seven stops are planned for the one-day excursion. Lunch will be in scenic Lyons, Colorado.

Field trip stops include:

1. Lyons Niobrara Quarry: Examine Niobrara Formation stratigraphy and discuss fracture systems
2. J Sandstone, Middle Fork Road, off of HW 36 (N. Foothills Hwy.)
3. Codell Sandstone, HW 36 (N. Foothills Hwy.)
4. Niobrara Formation B Bench, Fort Hays, Six Mile Fold
5. Boulder Oil Field, discuss fractured Pierre Shale production
6. Rocky Flats to discuss Front Range Structure, HW 93
7. J Sandstone Turkey Creek, Turkey Creek Road and 470



Field Trip Leader:

Steve Sonnenberg is a Professor of Geology and holds the Charles Boettcher Distinguished Chair in Petroleum Geology at the Colorado School of Mines. He specializes in unconventional reservoirs, sequence stratigraphy, tectonic influence on sedimentation, and petroleum geology. He is the Director/PI for the MUDTOC Consortium. A native of Billings, Montana, Sonnenberg received B.S. and M.S. degrees in geology from Texas A&M University and a Ph.D. degree in geology from the Colorado School of Mines. Steve began teaching at Colorado School of Mines in 2007 after working in the petroleum industry for more than 25 years. Steve has served as President of several organizations including the American Association of Petroleum Geologists, Rocky Mountain Association of Geologists, RMS-AAPG, and Colorado Scientific Society.

NETWORKING OPPORTUNITIES

Breakfast Bites with Exhibitors

Make your way to the Exhibit Hall following the Opening Plenary to meet with exhibitors. Grab a quick breakfast snack and cup of coffee before heading to technical sessions.

Date: Monday, 22 July
Time: 10:00a–11:00a

Opening Reception

Find time to unwind at the Opening Reception. Mix it up with exhibitors and industry peers while enjoying a beverage and hors d'oeuvres.

Date: Monday, 22 July
Time: 5:00p–7:00p

Refreshment Breaks

Break away from technical sessions. Talk with exhibitors, catch up on email, or grab a beverage during one of the Refreshment Breaks.

Dates: Monday, 22 July–Wednesday, 24 July
Times: 3:00p–4:00p (Monday and Tuesday)
10:00a–11:00a (Tuesday and Wednesday)

Networking Reception

Here is a great opportunity to wrap up your day and relax with a drink and light snack while visiting with exhibitors.

Date: Tuesday, 23 July
Time: 5:00p–6:00p



TECHNICAL PROGRAM

• URTeC REVIEWERS •

• TECHNICAL SESSIONS AT A GLANCE •

• TECHNICAL PROGRAM – MONDAY •

• TECHNICAL PROGRAM – TUESDAY •

• TECHNICAL PROGRAM – WEDNESDAY •

Theme 01: Operators' Forum: Case Studies Highlighting the Multidisciplinary Approach to Exploration, Appraisal, Pilot Tests, and Development of Unconventional Resources

Theme 02: Advanced Formation Evaluation of Unconventional Reservoirs

Theme 03: Geological Characterization of Unconventional Reservoirs

Theme 04: Geophysical Characterization of Unconventional Reservoirs

Theme 05: Geomechanics Integration – The Glue between Geoscience and Engineering

Theme 06: Applied Geochemistry and Basin Modeling for Unconventionals: From Source Rock to Produced Hydrocarbons

Theme 07: Machine Learning, AI, and Big Data in the Digital Oilfield

Theme 08: Increasing Recovery Efficiency in Unconventional Plays

Theme 09: Reserves Estimation and Production Forecasting

Theme 10: Production Performance of Tight Oil and Gas Reservoirs

Theme 11: New Materials and Novel Technologies for Unconventionals

Theme 12: Overcoming Gridlock: Unlocking the Midstream Bottleneck

Theme 13: Emerging Unconventional Plays and Novel Applications of Technology

Theme 14: Well Construction Optimization and Best Practices

Theme 15: License to Operate: Stakeholder Management and Social Performance

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Michael Ashby
Vahid Atashbari
Erkan Ay
Mohammed Badri
Craig Barrie
Javad Behseresh
Lauren Bergenheier
Leonardo Bermudez
Troy Beserra
David Blood
Kevin Bohacs
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Ye Wang
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Chandler Wilhelm
Olivia Woodruff
Kan Wu
Weiwei Wu
Xingru Wu
Jing Xiang
Rex Yalavarthi
Changdong Yang
Yuanhai Yang
Zhi Ye
Russell Young
Wei Yu
Farnaz Zarian
Zhenzhao Zhang
Shuang Zheng
John Zumberge

**A SPECIAL
THANKS
TO OUR
URTeC
REVIEWERS**

TECHNICAL SESSIONS AT A GLANCE

Sessions are numbered by theme—see page 18 for the full list.

Session Rooms						
Opening Plenary						
Monday Morning	05A. Microseismic Interpretation	08A. Case Studies in IOR/EOR Field Pilots	Panel: Sustainable Development Goals for Unconventionals	07C. Machine Learning, AI, and Big Data III	01A. Operators' Forum: Case Studies I	02A. Advanced Formation Evaluation I
Monday Afternoon	05C. Frac Modeling I: From Physics to Field	06A. Time Lapse Geochemistry and In-situ vs. Produced Fluids	Panel: Value Proposition of Microseismic Mapping of Hydraulic Fractures 02B. Advanced Formation Evaluation II: Flow Capacity and Permeability	03A. Depositional Processes of Unconventional Reservoirs	01C. Operators' Forum: Case Studies Highlighting Permian Basin Fracture Dynamics	09A. Reserves Estimation and Production Forecasting I: Well Spacing and Interference Impact
Tuesday Morning	03B. Aligning Geoscience and Engineering Workflows	05D. Frac Modeling II: From Physics to Field	14A. Panel: Hydraulic Fracturing and Its Effects on Well Integrity Panel: Recent Experiences with Induced Seismicity	09B. Reserves Estimation and Production Forecasting II: Performance Prediction and Future of Production Forecasting	01D. Operators' Forum: Case Studies Optimizing Well Performance	02C. Advanced Formation Evaluation III: Nuclear Magnetic Resonance
Tuesday Afternoon	Special Session: Hydraulic Fracture Test Sites	08C. Gas Injection EOR 08B. EOR in the Permian Basin	03C. Imaging Unconventional Reservoir Rocks at Various Scales	07A. Machine Learning, AI, and Big Data I	01E. Operators' Forum: Case Studies Highlighting Modeling and Technologies	02D. Advanced Formation Evaluation IV: Saturation, Volumes, and Recovery
Wednesday Morning	Special Session: ARMA—Principles, Simulation, and Practice 10D1. Furthering the Understanding of Fracture Behavior, Flowback, and SRVs I	08G. Huff and Puff in the Eagle Ford Basin	15A. License to Operate: Stakeholder Management and Social Performance I Panel: Next Technology Frontier in Unconventionals—What's Needed Versus What's in Development	07B. Machine Learning, AI, and Big Data II	01F. Operators' Forum: Case Studies From Geology to Completions	02E. Advanced Formation Evaluation V: Data Integration and Modeling
Wednesday Afternoon	10D2. Furthering the Understanding of Fracture Behavior, Flowback, and SRVs II	Special Session: Best of SPWLA	Panel: Data Analytics Update for Unconventionals—What's Missing?	09C. Reserves Estimation and Production Forecasting III: Reserves Implications	01B. Operators' Forum: Case Studies Highlighting Completion Optimization With an International Focus	13A. Emerging Unconventional Plays and Novel Applications of Technology I



Exhibit Hall

04C. Optimizing Geophysical Data for Unconventionals	Panel: Unconventional Play Development—A View from the Front Lines	11B. New Technology Applications for Unconventionals	04E. Source Rock Characterization Using Geophysics	07D. Machine Learning, AI, and Big Data IV	09D. Reserves Estimation and Production Forecasting IV: Case Studies	13B. Emerging Unconventional Plays and Novel Applications of Technology II	15B. License to Operate: Stakeholder Management and Social Performance II
04A. Reservoir Characterization Using DAS/DTS Fiber Optics	10A. Flow, Production, and Phase Behavior for Tight Oil and Shale Oil/Shale Gas Reservoir Systems	14B. Improving Drilling Performance and Design Using New Technologies, Methods, and Computing Power	03F. Geoscience Investigations of Unconventionals	05H. DFNs, Microseismic, and Geophysical Case Studies	05I. Geomechanics Integration and Rock Characterization	08H. Nanofluids, Surfactants, and Friction Reducers	10F. Topics in Production Performance of Tight Oil and Gas Reservoirs
04B. Deriving Rock Properties from Seismic	10B. Pressure Transient Testing, DFIT, and Well Testing	06B. Geochemistry of Oil-Prone and Gas-Prone Unconventional Resource Plays	02F. Advanced Formation Evaluation VI: Nuclear Magnetic Resonance, Permeability, and Recovery	03E. Depositional Processes of Unconventional Reservoirs	07E. Machine Learning, AI, and Big Data V	10E. Shale Facilities and Artificial Lift Optimization	11C. Proppant Transport and Novel Technologies
05E. Rock Characterization for Fracturing and Drilling	10C. Reservoir Modeling for Unconventionals: Bringing Together Data, Disciplines, and Design	11A. Proppant Placement and Novel Completion Technologies	08E. Pore-Network Imaging and Modeling to Understand Fluid Flow 08F. Enhanced Gas Recovery Methods in Unconventionals	02H. Advanced Formation Evaluation VIII: Integration of Geomechanics in Petrophysical Analysis	04D. Novel Techniques in Geophysics for Reservoir Characterization	05G. Frac Modeling III: From Physics to Field	06D. Geochemistry of Oil-Prone and Gas-Prone Unconventional Resource Plays
05F. Geomechanics Case Studies: Spacing, Interference, and Optimization	06C. Oil/Gas/Water: Fluid-Fluid, Fluid-Rock Interactions and Chemostratigraphy I	Special Session: Issues in the Unconventional Midstream	02G. Advanced Formation Evaluation VII: Integration, Saturation, and Recovery	06E. Oil/Gas/Water: Fluid-Fluid, Fluid-Rock Interactions and Chemostratigraphy II	08D. Flow Conformance and Sweep Efficiency Strategies	09E. Reserves Estimation and Production Forecasting V: Performance Prediction and Future of Production Forecasting	14C. Well Design and Drilling Advancements and Methods
05B. DFNs: From Characterization to Simulation	03D. Rock Quality and Horizontal Strategies and Challenges	12A. Overcoming Gridlock: Unlocking the Midstream Bottleneck	Exhibit Hall Closed				

MONDAY TECHNICAL PROGRAM

Monday Morning

Session Rooms

Panel: Unconventional Play Development—A View from the Front Lines

Moderators: S. Perry and T. Blasingame

Please see page 11 for more information on this panel.

Panel: Sustainable Development Goals for Unconventionals

Please see page 11 for more information on this panel.

01A. Operators' Forum: Case Studies I

Chair: R. Hull and J. Hernandez

- **Multi-Diagnostic Data Acquisition Project in a STACKed Play Delivers Key Subsurface Findings:** B. Pownall, J. Lassek, A. Munoz, B. Darlington (Newfield Exploration)

02A. Advanced Formation Evaluation I

Co-Chairs: C. G. Glaser and S. Fluckiger

- **New 4 $\frac{1}{2}$ -Inch High-Resolution Ultrasonic Borehole Imaging for Unconventional Reservoir Evaluation:** J. Lee, P. Li, A. Taher, R. Coates, R. Marlow (Halliburton)
- **Advanced Simultaneous Formation Evaluation and Completion-Oriented Rock Classification in the Midland Basin Using Integrated Analysis of Well Logs, Core Measurements, and Geostatistical Data:** A. Rostami¹, A. Jagadisan¹, Z. Heidari^{*1}, B. Fairhurst², I. Yurchenko², S. Ikonnikova², S. Hamlin² (¹The University of Texas at Austin; ²Bureau of Economic Geology)
- **Identification and Quantification of Parasequences Using Expectation Maximization Filter: Defining Well Log Attributes for Reservoir Characterization:** S. Sinha (University of Oklahoma)

04C. Optimizing Geophysical Data for Unconventionals

Co-Chairs: D. Langton and A. Biholar

- **Using HTI Anisotropy to Identify Wolfcamp Fracture Hazards in the Delaware Basin:** S. W. Cook¹, M. McKee², S. Bjorlie² (¹Tricon Geophysics, Inc.; ²Jetta Permian, LP)
- **Evaluating Compressive Sensing Efficacy on an Unconventional 3-D Seismic Dataset from the Duvernay:** M. Perz, N. Nagarajappa, D. Wilkinson, A. Dyke, D. Brost (TGS)
- **Marcellus Shale Energy and Environment Laboratory (MSEEL) Results: Improved Subsurface Reservoir Characterization and Engineered Completions:** T. R. Carr¹, P. K. Ghahfarokhi¹, B. Carney², J. J. Hewitt¹, R. Vargnetti³ (¹West Virginia University; ²Northeast Natural Energy, LLC; ³USDOE National Energy Technology Laboratory)

05A. Microseismic Interpretation

Co-Chairs: C. M. Sayers and A. Mubarak

- **A Methodology for Unstructured Damped Stress Inversion of Microseismic Focal Mechanisms:** B. Q. Li¹, J. Du² (¹Massachusetts Institute of Technology; ²TOTAL SA)
- **Investigation of Micro-Seismicity and Permeability Evolution in Shale Fractures During Stimulation:** Z. Ye, A. Ghassemi (The University of Oklahoma)
- **Stress Inversion Using Microseismic Moment Tensors in the Vaca Muerta Shale:** Y. Tan, S. Cuervo, S. Malhotra, S. Wang (Chevron Corporation)

07C. Machine Learning, AI, and Big Data III

Co-Chairs: B. Dindoruk and R. Pharis

- **Why Most Models Fail: The Importance of Blind Validation:** K. J. Wallace, A. Dang Atkinson, T. H. Yotter, C. P. Bernet, C. Gourgues (Encana Corporation)
- **An Artificial Intelligence Decision Support System for Developing Unconventional Field Development Design:** N. Tamimi, S. Samani, M. Minaei, F. Harirchi (NeuDax)
- **Application of Time-series Clustering to Forecast Wells with a Short Producing Life:** R. Khaksarfard, H. Tabatabaie*, L. Mattar (IHS Markit)

08A. Case Studies in IOR/EOR Field Pilots

Co-Chairs: A. L. Lerza and H. Kalaei

- **Industry-First Hydrocarbon-Foam EOR Pilot in an Unconventional Reservoir: Design, Implementation, and Performance Analysis:** A. Katiyar¹, P. Patil¹, P. Rozowski¹, J. Evans², T. Bozeman², Q. Nguyen³ (¹The Dow Chemical Company; ²MD America Energy LLC; ³The University of Texas at Austin)
- **Real-Time Geomechanical Effects on Improved Oil Recovery in the Bakken Formation:** S. Yang, Z. Chen (University of Calgary)
- **Enhanced Oil Recovery Trial Results: A Novel Approach to Water Flooding in Saskatchewan's Tight Oil Plays:** M. Kiani, T-P. Hsu, A. Roostapour, M. Kazempour, E. Tudor (Nalco Champion, An Ecolab Company)

11B. New Technology Applications for Unconventionals

Co-Chairs: Z. Wang and Y. Liu

- **Mechanical Properties of Propped and Unpropped Eagle Ford Shale and 3-D Printed Fractured Models Under Multistage Triaxial Stress:** S. Dande, R. R. Stewart, M. Myers, L. A. Hathon, N. Dyaur (University of Houston)
- **Frac Hit Mitigation: A Promising Business Opportunity in Unconventional Reservoirs to Reduce Cost and Boost Oil Recovery:** A. Roostapour, M. Kiani, M. Kazempour, K. He (Nalco Champion, An Ecolab Company)
- **Regional Sands and the Possible Impacts on Friction Reducer Performance:** M. Sinkey, C. Drennon, M. Thompson (Calfrac Well Services)

Exhibit Hall

01G. Operators' Forum: Case Studies II

- **Maximizing Asset Value by Full Field Development—Case Studies in the Permian Basin:** H. Xiong, R. Ramanathan, K. Nguyen (University Lands/Texas Oil & Gas Institute)
- **3-D Driven Rock Quality Mapping and Landing Target Selection in the Wolfcamp Formation: A Case Study on How to Combine Geologic, Geophysical, and Engineering Data to Produce Better Well Results, Midland Basin, Texas:** A. Fisher¹, F. O'Keefe¹, C. Niedz¹, B. Wehner¹, N. Kramer², P. Heuermann², S. Patrick³ (¹Tracker Resource Development; ²Apex Petroleum Engineering; ³Fracture ID)

04E. Source Rock Characterization Using Geophysics

Co-Chairs: A. Munoz and C. Story

- **Modeling the Effect of Maturity on the Elastic Moduli of Kerogen Using Atomistic Simulations:** A. Kashinath¹, M. Szulczewski¹, A. Dogru² (¹Aramco Services Company; ²Saudi Aramco)
- **A 3-D Model of Calculated Total Organic Carbon for the Delaware Basin:** I. Deighton¹, D. Smith², J. Keay¹ (¹TGS; ²IRT)
- **Developments Relating Total Organic Content Conversion to 3-D Seismic Attributes:** N. J. House¹, J. D. Edman² (¹Integrated Geophysical Interpretation Inc., LLC; ²Edman Geochemical Consulting, LLC)



Monday Afternoon

Session Rooms

Panel: Value Proposition of Microseismic Mapping of Hydraulic Fractures

Moderator: J. Shemeta

Please see page 11 for more information on this panel.

01C. Operators' Forum: Case Studies Highlighting Permian Basin Fracture Dynamics

Co-Chairs: B. Liang and J. Hnat

- **Hydraulic Fracturing Stimulation Monitoring with Distributed Fiber-Optic Sensing and Microseismic in the Permian Wolfcamp Shale Play:** R. Hull, V. Jayaram, J. Wagner (Pioneer Natural Resources)
- **Evaluating the Impact of Fracture Interference Between Primary, Infill, and Vertical Wells in the Midland Basin Lower Spraberry and Wolfcamp Reservoirs: Production and Time:** R. Y. Scherz¹, M. F. Rainbolt², Y. Pradhan¹ (¹Endeavor Energy Resources; ²Abra Controls Corporation)
- **New Insights into Hydraulic Fracture Dynamics: Learnings from a Pressure Monitoring Well in the Permian Basin:** V. Muralidharan, S. Esmaili, D. P. Craig (Occidental Petroleum Corporation)

02B. Advanced Formation Evaluation II: Flow Capacity and Permeability

Co-Chairs: K. Jerath and M. Manohar

- **An Advanced Nano Permeameter: Transformation from Point by Point Method to the Direct Measurement of Permeability Pressure Function:** H. Liu, H. Chen, J. Zhang, G. Eppler (Aramco Research Center)
- **Gas Relative Permeability and Evolution During Water Imbibition in Unconventional Reservoir Rocks: Direct Laboratory Measurement and a Conceptual Model:** S. Peng (The University of Texas at Austin)
- **A Novel Non-Destructive and Rapid Cleaning Method for Intact Ultra-Low Permeability Rocks:** A. Guede, W. Mickelson, S. Aldin, D. Gokaraju, A. Mitra, A. Thombare, R. Patterson, M. Aldin (MetaRock Laboratories)
- **Estimation of the Permeability of an Unconventional Formation Core by History-Matching the Saturation with CO₂:** Z. Chen, G. Jian, X. Wang, L. Zhang, P. M. Singer, G. J. Hirasaki (Rice University)

03A. Depositional Processes of Unconventional Reservoirs

Chair: D. Anderson

- **Unraveling the Secrets of the Eaglebine:** A. Donovan (Texas A&M University)
- **The Effects of the Maness Shale on Eagle Ford Water Production:** R. A. Denne, S. A. Patterson (Texas Christian University)
- **Stratigraphic Partitioning and Distribution of Reservoir Attributes Within the Late Devonian Duvernay Formation, Western Canada Sedimentary Basin:** A. M. Thorson¹, S. C. Atchley¹, J. A. W. Weissenberger², D. W. Yeates¹, E. G. Rau¹ (¹Baylor University; ²Gran Tierra Energy)
- **Reservoir Facies, Depositional Processes, and the Implications on Reservoir Characterization of the Wolfcamp A, Texas Delaware Basin:** J. Colborne, S. Sonnenberg (Colorado School of Mines)
- **Reservoir Characterization of the Bone Spring and Wolfcamp Formations, Delaware Basin, Ward County, West Texas:** A. N. Bievenour, S. A. Sonnenberg (Colorado School of Mines)
- **Sedimentologic and Stratigraphic Controls on Reservoir Sweet Spots in Wolfcamp 'A,' Howard County, Midland Basin:** A. N. Flotron, E. K. Franseen, R. H. Goldstein (Kansas Interdisciplinary Carbonates Consortium [KICC], University of Kansas, Department of Geology)
- **Anomalous Fluid Distribution Due to Late-Stage Gas Migration in a Tight Oil and Gas Deltaic Sandstone Reservoir:** P. K. Pedersen (University of Calgary)

- **How Organic Carbon Content and Thermal Maturity Affect Acoustic Properties (and Ultimately Seismic Response) in a Shale Gas/Oil Formation: Woodford Shale, Permian Basin:** N. B. Harris¹, A. Moghadam², T. Dong³ (¹University of Alberta; ²Northern Alberta Institute of Technology; ³China University of Geosciences [Wuhan])

07D. Machine Learning, AI, and Big Data IV

Co-Chairs: R. Ratnakar and M. Nance

- **Optimizing Unconventional Completion Designs: A New Engineering- and Economics-Based Approach:** S. Schubarth¹, R. Chabaud¹, S. Holditch² (¹Schubarth Software Systems LLC; ²Texas A&M University)
- **Bulk Data Sharing Process Improves Collaboration and Saves Time While Increasing Trust in Data Accuracy:** P. Neri (Energistics)
- **Mechanical Rock Properties Estimation Beyond Traditional Considerations:** Y. Gong¹, F. Xiong¹, I. El-Monier¹, F. Xu² (¹The Ohio State University; ²RIPED, CNPC)
- **Innovative Deep Autoencoder and Machine Learning Algorithms Applied in Production Metering for Sucker-Rod Pumping Wells:** Y. Peng (RIPED PetroChina)

09D. Reserves Estimation and Production Forecasting IV: Case Studies

Co-Chairs: N. Moridis, C. Virues, and P. Sainani

- **Statistical Analysis of Unconventional Well Productivity Drivers with Particular Focus on Child Well Impact: Permian Delaware Example:** A. Abramov (Rystad Energy)
- **Powder River Basin Production Review from 2011 Through 2018: How Refinements in Completions and Operations Have Led to Increasing Production in the Upper Cretaceous Formations of Campbell and Converse Counties, Wyoming:** J. Kegel, T. Mirenda, N. Lenz, J. Keay, C. O'Reilly (TGS)
- **Faster Tight Oil Decline Rates Could Mean Growing Project Spend and More Deals:** R. Clarke, R. Duman (Wood Mackenzie)
- **The Sensitivity of Well Performance to Well Spacing and Configuration—A Marcellus Case Study:** A. Khodabakhshnejad, A. Rahimi Zeynal, C. W. Neuhaus (MicroSeismic, Inc.)

13B. Emerging Unconventional Plays and Novel Applications of Technology I

Co-Chairs: A. Sloan and D. Livasy

- **Khalij Al Bahrain Basin: The Emerging Unconventional Play of the Middle East:** A. Shehab, Y. Alansari*, A. Ahmed, A. Sarfaraz, G. Al Moulani, A. Alrumaidh, A. Alali (Tatweer Petroleum)
- **Highly Productive Zones' Characterization Through an Integrated Electrofacies Core Workflow in Vaca Muerta Formation, Neuquen Basin, Argentina:** F. Vittore, C. Bernhardt, F. Gonzalez Tomassini, F. Lozano, G. Manestar (YPF SA)
- **Cenomanian Shilaif Unconventional Shale Oil Potential in Onshore Abu Dhabi, UAE:** P. Van Laer, K. Leyrer, M. Povstyanova, M. Z. Baig, G. Makarychev, T. D. Brooks, C. Malaver, N. Casson, H. Al Marzooqi, M. R. Al Zaabi (ADNOC)
- **Mesozoic Unconventional Potential of the Burgos Basin, Mexico:** G. Zimbrick (Dolan Integration Group)

15B. License to Operate: Stakeholder Management and Social Performance I

Co-Chairs: S. M. Carpenter and P. Fanailoo

- **Regional Geologic Characterization of the Grayburg San Andres Reservoir for Salt Water Disposal Management, Midland Basin, Texas:** T. Wilson, M. Handke, D. Loughry, L. Waite, B. Lowe (Pioneer Natural Resources)
- **Fracture Modeling for Cap Rock Integrity and Completion Evaluation in Produced Water Re-injection Wells:** A. S. Bagci (Baker Hughes, a GE Company)
- **Evaluating the Ellenburger Reservoir for Salt Water Disposal in the Midland Basin: An Assessment of Porosity Distribution Beyond the Scale of Karsts:** T. Sanchez, D. Loughry, V. Coringrato, B. Lowe (Pioneer Natural Resources)

*Denotes presenter other than first author | Green shading denotes a team presentation

MONDAY TECHNICAL PROGRAM

04A. Reservoir Characterization Using DAS/DTS Fiber Optics

Co-Chairs: S. Maxwell and D. Kahn

- **Time-Lapse Seismic Monitoring of Individual Hydraulic Frac Stages Using a Downhole Distributed Acoustic Sensing Array:** G. Binder¹, A. Titov¹, D. Tamayo¹, J. Simmons¹, A. Tura¹, D. Monk², G. Byerley² (¹Colorado School of Mines; ²Apache Corporation)
- **Time-Lapse WAW VSP Imaging of an Unconventional Reservoir Using DAS Fiber Optics:** J. A. Chavarria¹, D. Kahn², D. Langton², S. Cole¹, X. Li¹ (¹OptaSense; ²Devon Energy)
- **Seismic Reflection Imaging Using Microseismic Events as Seismic Sources Recorded on Horizontal DAS Fiber for Reservoir Properties:** D. Langton¹, D. Kahn¹, B. Fuller² (¹Devon Energy; ²Sterling Seismic & Reservoir Services)
- **Estimation of Hydraulic Fracture Height and Pressure Deflation Using a Pulsed Vertical Seismic Profile and a DAS Fiber in the Midland Basin:** R. Meek, R. Hull, K. Woller, B. Wright, M. Martin, H. Bello (Pioneer Natural Resources)
- **Fiber Optic Sensing-Based Production Logging Methods for Low-Rate Oil Producers:** G. Jin, K. Frieauf, J. J. Constantine, R. Baishali, K. R. Krueger, K. T. Raterman, H. W. Swan (ConocoPhillips)
- **Validating Single Stage Versus Multi-Stage Completion Strategies Using Near-Wellbore Diverter with Carbon Rod-Conveyed Distributed Fiber Optics in the Meramec:** A. Attia¹, R. Gible², M. Lawrence¹, J. Simmons¹ (¹Ziebel; ²TapStone Energy)

05C. Frac Modeling I: From Physics to Field

Co-Chairs: A. Ghassemi, D. Haddad, and W. Wu

- **Modeling and Analysis of Proppant Transport and Deposition in Hydraulic/Natural Fracture Networks:** D. Kumar, A. Ghassemi* (University of Oklahoma)
- **Proppant Placement in Perforation Clusters in Deviated Wellbores:** M. Zhang, C-H. Wu, M. M. Sharma (The University of Texas at Austin)
- **What Do Hydraulic Fractures Look Like in Different Types of Reservoirs? Implications from a Series of Large-Scale Polyaxial Hydraulic Fracturing Experiments from Conventional to Unconventional:** Y. Peng, H. Fu, M. Cui (RIPED PetroChina)
- **Quantifying the Induced Stresses During Multi-Stage, Multi-Well Stacked-Lateral Completions to Improve Pad Productivity:** R. Suarez-Rivera, E. Dontsov, B. Abell, R. Panse, P. Dharwadkar (W.D. Von Gonten Laboratories)
- **Geomechanical, Geological, and Engineering Controls of Hydraulic Fracturing:** G. Han¹, K. Bartko², U. Mutlu³ (¹Aramco Services Company; ²Saudi Aramco; ³Rockfield Global)
- **Integrated Natural and Hydraulic Fracture Modeling: A Permian Basin Wolfcamp Case Study:** F. Bessa, J. Tan, M. Frass, J. Kessler, V. Sahni, S. Liu (Occidental Petroleum Corporation)
- **Optimizing Completions in Tank Style Development:** P. S. Kaufman¹, M. McClure², N. Franciose¹, S. Owens¹, F. Srur¹, D. Russell¹ (¹QEP Resources, Inc.; ²ResFrac Corporation)

06A. Time Lapse Geochemistry and In Situ Versus Produced Fluids

Co-Chairs: H. Long and R. Hill

- **Understanding Dynamic Production Contribution from Hydraulically Fractured Middle Bakken and Three Forks Wells in the Williston Basin Using Time-Lapsed Geochemistry:** S. Wright¹, S. G. Franks², J. Pantano³, M. Kloska¹, J. Wolters¹ (¹Hess Corporation; ²RockFluid Systems; ³Consultant)
- **Naturally Occurring Isotopic Tracers Provide Insight into Hydraulic Fracturing Flowback and Horizontal Well Clean-Up Dynamics:** P. Travers¹, B. Burke², S. Hodgetts¹, M. Dolan¹ (¹Dolan Integration Group; ²HighPoint Resources)
- **Assessing Drainage Dynamics in the Eagle Ford Using Produced Water Geochemistry:** J. Jweda, T. Deptola, B. Gross, E. Michael, K. McLin, R. Hofer (ConocoPhillips)
- **Production Allocation in Tight Reservoirs That Contain Migrated Oil:** J. Adams (Weatherford)

- **Production Fractionation and Efficiency Indicators from Phase Snapshots:** B. Horsfield¹, N. Mahlstedt¹, E. Michael², N. McMahon³, M. H. Tobey⁴ (¹GEOS4 GmbH; ²ConocoPhillips; ³Kimmeridge Energy; ⁴Encana Corporation)
- **Petroleum System Analysis Using Unconventional Gas Geochemistry: Examples from the Montney Play of Western Canada:** T. Euzen¹, J-Y. Chatellier², N. Watson³, A. Mort⁴, X. Mangelot⁵ (¹IFP Technologies (Canada) Inc.; ²Tecto Sedi Integrated; ³Enlighted Geoscience Ltd.; ⁴Geological Survey of Canada; ⁵Caltech)
- **High-Resolution Fluid Tracking from Verticals and Laterals Using Subsurface DNA Diagnostics in the Permian Basin:** J. Christofferson¹, M. Hale¹, E. Menendez¹, E. Percak-Dennett^{*2}, J. Liu², L. Ursell², T. Ishoe² (¹Novo Oil & Gas LLC; ²Biota)

09A. Reserves Estimation and Production Forecasting I: Well Spacing and Interference Impact

Co-Chairs: Y. Pradhan, D. S. Jones, and J. McLaughlin

- **Frac Hits in the Southeastern Midland Basin, Reagan County, Texas:** B. McDowell, A. Yoelin, B. Pottebaum (Discovery Natural Resources)
- **Numerical Investigation of Key Factors on Successful Subsequent Parent Well Water Injection to Mitigate Parent-Infill Well Interference:** N. Li, K. Wu, J. Killough (Texas A&M University)
- **Intra-Well Interference in Tight Oil Reservoirs: What Do We Need to Consider? Case Study from the Meramec:** M. Almasoodi¹, R. Vaidya¹, Z. Reza² (1. Devon Energy; 2. University of Oklahoma)
- **Well Spacing Optimization in Shale Reservoirs Using Rate Transient Analytics:** C. Aniemena, C. LaMarca (BP)
- **Eagle Ford Fluid Variation and Completion Optimization: A Case for Data Analytics:** F. Siddiqui¹, A. Rezaei¹, M. Y. Soliman¹, B. Dindoruk^{1,2} (¹University of Houston; ²Shell International Exploration and Production)
- **Analytical Model to Estimate the Fraction of Fracture Hits Between Two Multi-Fractured Horizontal Wells:** O. M. Molina, M. Zeidouni (Louisiana State University)
- **Impact of Natural Fractures on Drained Rock Volume and Pressure Depletion Profile in Unconventional Reservoirs: Case Studies from the Permian Basin:** A. Khanal, R. Weijermars (Texas A&M University)

10A. Flow, Production, and Phase Behavior for Tight Oil and Shale Oil/Shale Gas Reservoir Systems

Co-Chairs: G. Gupta and T. Firincioglu

- **Experimental and Mechanism Study of CO₂ and Bakken Oil Interactions at Equilibrium and Non-Equilibrium Conditions:** Y. Yang, Q. Fu, X. Li, J-S. Tsau, R. Barati (University of Kansas)
- **Field-Wide Equation of State Development:** B. Younus, C. H. Whitson, M. L. Carlsen, S. Martinsen, K. Singh, A. Alavian (PERA AS)
- **Vapor-Liquid Equilibria of CO₂/Hydrocarbon System in Nanopores of Tight and Shale Rocks:** X. Dong¹, Z. Chen² (¹China University of Petroleum (Beijing); ²University of Calgary)
- **Measurement of Gas-Oil Relative Permeability in Unconventional Rocks:** S. S. Chhatre, A. L. Chen, D. W. Berry, R. Longoria, K. B. Guice, D. R. Maloney (ExxonMobil Upstream Research Company)
- **Numerical Investigation of Water Blockage in Secondary Fractures and Apparent Permeability Modeling in Shale Gas Production:** C. Zhong, J. Leung* (University of Alberta)
- **Effect of Proppant Design on Production Decline of Shale Wells in Permian:** A. Yang, R. Carbre, A. Abramov, A. Ramos-Peon (Rystad Energy)
- **Experimental Study of the Phase Behavior of Hydrocarbon Fluids in Porous Media at Atmospheric and Elevated Pressures:** T. Regueira, D. R. Sandoval E. H. Stenby, W. Yan (Center for Energy Resources Engineering [CERE], Technical University of Denmark)



14B. Improving Drilling Performance and Design Using New Technologies, Methods, and Computing Power

Chair: I. Aviles

- **Multilaterals—An Unconventional Approach to Unconventional Reservoirs:** D. Wilcox¹, S. Cappiello¹, M. Sevilla², E. Shafer², G. Gill², I. Kress², N. Sanchez² (¹Halliburton; ²ConocoPhillips)
- **Automated Surface Measurements of Drilling Fluid Properties: Field Application in the Permian Basin:** S. Gul¹, E. van Oort¹, H. Dearing², K. Sampey², C. Mullin³, D. Ladendorf⁴ (¹The University of Texas at Austin; ²Stage 3 Separation; ³Pioneer Natural Resources; ⁴Royal Dutch Shell)
- **New Low-Density Cement Technology Overcomes Limitations for Improved Well Design in the Williston Basin:** A. Jordan¹, L. Albrighton¹, M. Spirek¹, R. Pernites¹, B. Rollins², T. Lauer² (¹BJ Services; ²Whiting Petroleum Corporation)
- **Selection of Logging While Drilling Measurements for Geosteering of Horizontal Wells in Unconventional Reservoirs:** J. M. Gremillion¹, Z. Newnam², J. Campbell², M. Flowers¹, N. Tvrđy¹, M. Okoro¹ (¹Schlumberger; ²Sierra Resources LLC)
- **Cybersteering: Automated Geosteering by Way of Distributed Computing and Graph Databases in the Cloud:** T. Arbus, S. Wilson (Devon Energy)

Exhibit Hall

03F. Geoscience Investigations of Unconventionals

Co-Chairs: L. Canter and A. A. Curtis

- **Unconventional Rock Requires Unconventional Analysis: Methods for Characterization:** S. Butler, A. Azenkeng, B. Mibeck, K. Eylands, B. Kurz (University of North Dakota Energy & Environmental Research Center)
- **Azimuthal Gamma Imaging and Continuous Inclination Applications to Spatial and Stratigraphic Wellbore Placement Improvement in the Midland Basin:** C. Viens (Nabors Drilling Solutions)
- **A Powerful and Practical Workflow for a Naturally Fractured Reservoir with Complex Fracture Geometries from Modeling to Simulation:** F. Xu¹, X. Li¹, W. Yu^{2,3}, Y. Gong⁴, X. Li¹, J. Miao^{3,5}, C. Lei¹, (¹RIPE, CNPC; ²Texas A&M University; ³The University of Texas at Austin; ⁴The Ohio State University; ⁵SimTech LLC)
- **Probing Impact of Chemical Diagenesis on the Evolution of Migration Pathways in Unconventional Resources Using Multi-Physics Multi-Scale Modeling: Woodford Shale:** Y. Zapata, K. N. Garrett, R. D. Elmore, Z. Reza (University of Oklahoma)

05H. DFNs, Microseismic, and Geophysical Case Studies

Co-Chairs: B. Lai and H. Hosseinpour

- **Textural Characteristics of Shale Deformations, and Associated Distribution Models: Implications for Shale Reservoir Fluid Flow:** J. Buckman, G. Couples*, H. Lewis (Heriot-Watt University)
- **Drill Bit Geomechanics and Fracture Diagnostics Optimize Completions in the Powder River Basin:** E. L. Scott¹, E. Romberg¹, C. Ramos² (¹Fracture ID; ²Core Laboratories)
- **Integrated Geomechanical Interpretation of Hydraulic Stimulation Operations Using Distributed Vibration Sensing:** M. Williams, J. Le Calvez*, C. Wilson, A. Rodriguez-Herrera (Schlumberger)
- **Microseismic Bedding-Plane Slip Theory—Requires a Very Slippery Slope or a Very Large S_{Hmax} :** O. J. Teran, M. P. Thornton (MicroSeismic, Inc.)
- **Comparative Laboratory Scale Reservoir Simulation Study on Geomechanical Property Alterations Arising from Osmosis Pressure Distribution Within Organic-Rich Shales:** O. Adekunle, A. Tutuncu (Colorado School of Mines)
- **Construction of a Discrete Fracture Network in the Permian Basin Using Seismic Prestack Inversion:** L. D. den Boer, C. Inyang, C. M. Sayers* (Schlumberger)
- **A Geomechanical Approach for Evaluating Hydraulic Stimulation in Complex Stratigraphies:** W. Dershowitz¹, H. Hosseinpour², M. Cottrell³ (¹GeoFractal LLC; ²Golder Associates Inc; ³Golder Associates UK Ltd)

- **Impact of Pore Pressure on Hydraulic Fracture Geometry and Well Spacing in the East Duvernay Shale Basin, Canada:** F. Alimahomed, E. Wigger, M. Drouillard (Schlumberger)

05I. Geomechanics Integration and Rock Characterization

Co-Chairs: R. Manchanda and M. Sarkar

- **Establishing an Empirical Relationship Between Impulse Hammer and Triaxial Test Derived Rock Mechanical Properties:** M. Hussain¹, S. Ali¹, A. Amoo², K. Al-Ramadan², G. Jin¹ (¹BHGE; ²KFUPM)
- **Testing the Value of Rebound Hardness in Estimating Petrophysical and Rock Mechanical Properties from Core and Well Logs, the Unconventional "Mississippian Limestone"-STACK Plays, North-Central Oklahoma, USA:** Y. Wang¹, G. M. Grammer¹, R. Nygaard² (¹Boone Pickens School of Geology, Oklahoma State University; ²School of Chemical and Petroleum Engineering, Oklahoma State University)
- **A Comparative Study of Organic Richness and Maturity Impact on Anisotropic Geomechanical Properties in Shale Reservoirs:** A. N. Tutuncu (Colorado School of Mines)
- **3-D Geomechanical Modeling for Field Development of a Colombian Shale Play:** L. Arias Medina, A. N. Tutuncu (Colorado School of Mines)
- **Anisotropic Borehole Stability Analysis for the UK's First Horizontal Shale Gas Well in the Bowland Basin:** H. Clarke¹, H. Soroush² (¹Cuadrilla Resources Ltd; ²PETROLERN LLC)
- **An Experimental Investigation of the Anisotropic Dynamic and Static Properties of Eagle Ford Shales:** Y. Wang¹, D. Han¹, L. Zhao², S. Aldin³, M. Aldin³ (¹University of Houston; ²Tongji University; ³MetaRock Laboratories)
- **Optimization of Coalbed Methane Multi-Lateral Drilling in the San Juan Basin via Wellbore Stability Modeling and Data Analytics:** J. D. Escobar Gomez, H. LaReau, J. H. Hornbuckle, J. J. Melick, D. A. Schoderbek (BPX Energy)
- **An Improved Fractal Permeability Model for Heterogeneous Unconventional Reservoir Considering Multi-Physics and Flow Regimes:** J. Tian¹, J. Liu¹, D. Elsworth², W. Li¹, J. Zeng¹ (¹Department of Chemical Engineering, The University of Western Australia; ²Department of Energy and Mineral Engineering, The Pennsylvania State University)

08H. Nanofluids, Surfactants, and Friction Reducers

Co-Chairs: Y. Shin and A. Martinez

- **Quantification of Dynamic Sand Settling Velocity in High-Viscosity Friction Reducers and Correlation with Rheology:** Y. Hu, P. Kurian (Nalco Champion, An Ecolab Company)
- **A Cationic Friction Reducer Fully Compatible with Produced Water:** L. Shen, D. Heller, D. Fu (BJ Services)
- **Abiotic Transformation Kinetics of Hydraulic Fracturing Fluid Surfactants:** B. C. McAdams^{1,2}, L. C. Burrows^{1,2}, J. A. Hakala¹, (¹National Energy Technology Laboratory; ²Oak Ridge Institute of Science and Education)
- **New Methodology to Evaluate Oil Flow Enhancement Chemistry in Unconventional Formations:** E. S. Cambre¹, K. Boyle², A. Abedini², X. Zhang² (¹Tendeka; ²Interface Fluidics)
- **Experimental and Numerical Study of Shale Oil EOR by Surfactant Additives in Fracturing Fluid:** J. Tu, J. Sheng (Texas Tech University)
- **Rapid Development of a Smart Stimulation Fluid Additive:** A. Recio III, K. Henkel-Holan, D. Benoit (Halliburton)
- **Effect of Nanoparticles and Surfactants on Oil/Water Interfacial Tension: A Coarse-Grained Molecular Dynamics Simulation Study:** C. Li, H. Pu, S. Zhang, J. Zhao (University of North Dakota)
- **Comprehensive Study of Elasticity and Shear-Viscosity Effects on Settling Velocity in Unconfined and Confined Fracture Using High Viscosity Friction Reducer (HVFRs) Fluids:** M. Ba Geri (Missouri University of Science and Technology)

MONDAY TECHNICAL PROGRAM

10F. Topics in Production Performance of Tight Oil and Gas Reservoirs

Co-Chairs: A. Oudinot and G. Koperna

- **Experimental Investigation of Propped Fracture Conductivity and Proppant Diagenesis:** A. K. Gupta, C. S. Rai, C. H. Sondergeld (University of Oklahoma)
- **Improved Real-Time Understanding of Dynamic Fracture Behavior in Unconventional Horizontal Wells Using Wavelet Transformation:** E. Unal¹, F. Siddiqui¹, M. Y. Soliman¹, B. Dindoruk² (¹University of Houston; ²Shell International Exploration and Production)
- **Applying Rate Transient Analysis (RTA) to Assist Fracturing Technique Selection in Unconventional Wells in Saudi Arabia:** J. I. Rueda, J. D. Valbuena, A. M. Al-Momen, N. I. Al-Mulhim (Saudi Aramco)
- **Application of Flow Control Device in Horizontal Wellbore Improves Well Performance and Reservoir Management: A Numerical Study in the Permian Basin:** P. Pankaj, D. A. Ogunlana (Schlumberger)



TUESDAY TECHNICAL PROGRAM

Tuesday Morning

Session Rooms

Panel: Hydraulic Fracturing and Its Effects on Well Integrity

Moderator: Terry Palisch

Please see page 13 for more information on this panel.

Panel: Recent Experiences with Induced Seismicity

Moderators: H. Macartney and S. Maxwell

Please see page 13 for more information on this panel.

01D. Operators' Forum: Case Studies Optimizing Well Performance

Co-Chairs: G. Ugueto, B. Pownall, and R. Roper

- **High Viscosity Friction Reducer Testing, Trialing, and Application: A Permian Basin Case Study:** N. Zakhour, R. Suleman, D. Craig (Occidental Petroleum Corporation)
- **Optimizing Perforating Schemes to Achieve Uniform Proppant Distribution:** M. Fry, A. Altieri (Rockdale Energy)
- **First Ever Polymer Flood Field Pilot to Enhance the Recovery of Heavy Oils on Alaska North Slope—Polymer Injection Performance:** S. Ning¹, J. Barnes¹, R. Edwards¹, K. Dunford¹, A. Dandekar², Y. Zhang², D. Cercione³, J. Ciferno³ (¹Hilcorp; ²University of Alaska, Fairbanks; ³National Energy Technology Laboratory)
- **Does Soaking Process After Hydraulic Fracturing Improve Well Performance in Shale Formations? Field Cases:** A. F. Ibrahim, M. Ibrahim (Apache Corporation)

02C. Advanced Formation Evaluation III: Nuclear Magnetic Resonance

Co-Chairs: V. Cedeno Montoya and B. Hill

- **NMR Wettability Index Measurements on Unconventional Samples:** M. Dick¹, D. Veselinovic¹, D. Green¹, A. Scheffer-Villarreal², R. Bonnie², S. Kelly², K. Bower² (¹Green Imaging Technology; ²ConocoPhillips)
- **NMR Signature and Quantification of Bitumen in Unconventional Source Rocks:** S. M. Althaus, J. Chen, D. Jacobi, J. Brothers (Aramco Services Company)
- **Effects of Temperature and Pressure on the Interpretation of NMR Hydrocarbon Measurements in Organic-Rich Shale:** S. T. Dang, C. Sondergeld, C. Rai (University of Oklahoma)
- **A High-Frequency NMR Investigation of Eagle Ford Shale Cores:** J. S. S. Kanwar, A. N. Tutuncu, Y. Yang (Colorado School of Mines)
- **High-Frequency (20 MHz) NMR and Modified Rock-Eval Pyrolysis Methods as an Integrated Approach to Examine Producibility in Kerogen-Rich Source-Reservoirs:** H. Carvajal-Ortiz¹, T. Gentzis¹, H. Xie¹, P. Hackley² (¹Core Laboratories; ²U.S. Geological Survey, Eastern Energy Resources Science Center)
- **Accurate Pore Size Measurement via NMR on Unconventionals:** M. Dick, D. Green, D. Veselinovic (Green Imaging Technology)

03B. Aligning Geoscience and Engineering Workflows

Co-Chairs: R. Blood and M. French

- **Fault Risk Assessment Using Quantitative Structural Geology Techniques:** N. Eichelberger¹, W. B. Hawkins² (¹StructureSolver LLC; ²GeoFlite Solutions LLC)
- **An Integrated, Multiscale Geomodel of the Northern Delaware Basin:** R. Domisse¹, X. Janson¹, F. Male², S. Payne³, A. Lewis⁴ (¹Bureau of Economic Geology, University of Texas; ²Hildebrand Department of Petroleum and Geosystems Engineering, University of Texas; ³Ikon Science; ⁴Fairfield Geotechnologies)
- **Investigation of Upscaling Approaches for Stress-Dependent Permeability: Effects of Natural Fractures and Carbonate:** C. An, J. Killough (Texas A&M University)

- **A Geomechanics-Driven Facies Model to Reconcile Production, Inform Completion Strategies, and Determine Landing Zones in the Green River Basin:** T. Dallegge¹, T. Mullen¹, J. Mazza², J. Havens² (¹Jonah Energy LLC; ²Fracture ID)
- **The Influence of Micro-Fabric Heterogeneity on Sheared Rock Properties:** D. Crandall, M. Gill, J. Moore, S. Brown (National Energy Technology Laboratory)
- **Successful Downhole Microfracture and PVT-Quality Formation Fluid Sampling from an Unconventional Reservoir:** J. Corredor¹, E. Hutto², F. Hamza², B. Grieser², H. Tahani² (¹Devon Energy; ²Halliburton)
- **Lithologically Controlled Pore Pressure Prediction and Geomechanical Modeling Using Probabilistic Multivariate Clustering Analysis and an Expert System:** A. A. Curtis¹, E. Eslinger¹, S. Nookala², F. Boyle¹ (¹eGAMLS Inc.; ²Cerone Pvt Ltd)

04B. Deriving Rock Properties from Seismic

Co-Chairs: A. Munoz, M. Rauch-Davies, and K. Dowdell

- **Pore Pressure Prediction in the Permian Basin Using Seismic Pre-Stack Inversion:** C. M. Sayers, L. den Boer (Schlumberger)
- **Usage of Facies-Oriented Seismic Pre-Stack Inversion in Rock Property Prediction and Geosteering in the Delaware Basin, Southeast New Mexico:** A. Biholar, M. Rauch-Davies, S. Smith, D. Langton, C. Mace (Devon Energy)
- **Seismic Reservoir Characterization of the Bone Spring and Wolfcamp Formations in the Delaware Basin with Efforts at Quantitative Interpretation—A Case Study:** S. Chopra (TGS Canada)
- **Fracture Geometry Modeling Using Far-Field In Situ Stress from 3-D Seismic: Delaware Basin Example:** M. Shoemaker, J. Hawkins, J. Becher, V. Gonzales, S. Mukherjee, R. Garmeh, D. Kuntz (Callon Petroleum Company)
- **Understanding the Spatial Geological Heterogeneity of the Delaware Basin from Pre-Stack Seismic Inversion:** S. S. Payne¹, A. Lewis², B. Hardy¹, V. Anantharamu¹, I. Russell-Hughes¹ (¹Ikon Science; ²Fairfield Geotechnologies)
- **Seismically Driven Estimation of Stress Rotation and Anisotropy and Its Impact on Well Performance—Application to the Delaware Basin:** C. Story¹, M. Perz², N. M. Umholtz³, A. Ouenes³ (¹Anadarko Petroleum Corporation; ²TGS; ³FracGeo)
- **Estimation of Total Organic Carbon (TOC) Content of Shale from AVO Inversion: A New Crossplot Approach Based on Zoeppritz Equations:** U. Y. Lim, R. L. Gibson, N. Kabir (Texas A&M University)

05D. Frac Modeling II: From Physics to Field

Co-Chairs: G. Han, K. Huffman, and V. Sesetty

- **Modeling Dense Arrays of Hydraulic Fracture Clusters in Shale:** V. Sesetty, A. Ghassemi (University of Oklahoma)
- **Standardizing Offset Pressure Characterization for Infill Completion in Unconventional Reservoirs:** E. Coenen, J. Mayorga (Reveal Energy Services)
- **Optimizing Cube Development Completion Designs with Massive Computer Simulations:** E. Dontsov¹, A. Bunger², B. Abell¹, R. Suarez-Rivera¹ (¹W. D. Von Gonten Laboratories; ²University of Pittsburgh)
- **Simulating Production from Complex Fracture Networks: Impact of Geomechanics and Closure of Propped/Unpropped Fractures:** S. Zheng, A. Kumar, D. Gala, K. Shrivastava, M. M. Sharma (The University of Texas at Austin)
- **Quantifying Hydraulic Fracture Height Reduction in the Presence of Laminations and Weak Interfaces—Validation with Microseismic Moment Tensor Inversion in the Montney Shale:** M. Ng¹, Y. Aimene², C. Hammerquist², A. Ouenes² (¹Painted Pony; ²FracGeo)
- **Height Growth in Layered Unconventional Reservoirs: The Impact of Modulus, Bedding Planes, and Natural Fracture Properties:** Q. Gao, A. Ghassemi (The University of Oklahoma)
- **Making Frac Hits History with Computational Physics on the Cloud:** D. Cotrell, T. Hoeink, S. Ghorpade, E. Odusina (Baker Hughes, a GE Company)

TUESDAY TECHNICAL PROGRAM

06B. Geochemistry of Oil-Prone and Gas-Prone Unconventional Resource Plays

Co-Chairs: O. Woodruff and C. Donohue

- **Using Solvent Extracts to Estimate the Amount of Producing Oil in Cores Selected from the Lower Eagle Ford Marl:** A. S. Kornacki (Weatherford)
- **Use of Petroleum Geochemical Data to Assess the Presence of Conventional Migrated Oil in Produced Shale Oil—Example from the Midland Basin:** R. Patience¹, G. Hansen¹, S. Secrest², B. McDaniel² (¹Applied Petroleum Technology; ²Petrolegacy LLC)
- **Vaca Muerta Unconventional Oil Study—Insights from Organic Geochemistry:** N. Mahlstedt¹, B. Horsfield¹, H. Karg², P. David², T-U. Garlich³ (¹GEOS4 GmbH; ²Wintershall Holding)
- **Comparative Baseline Assessment of Organic Constituents from Pyrolysis for Improved Unconventional Source Rock Characterization:** I. McGlynn, J. Raines, F. Walles (Baker Hughes, a GE Company)
- **Maturity Profiling of Vaca Muerta Formation by Raman Spectroscopy:** A. C. Ortiz¹, C. Bernhardt¹, W. Abdallah², P. Saldungaray², B. Sauerer² (¹YPF; ²Schlumberger)
- **Variability in Oil Generation and Migration with Thermal Maturity: Wolfcamp and Spraberry Formations, Northern Midland Basin, Texas:** W. R. Drake¹, A. Bazzell¹, J. E. Zumberge², J. B. Curtis² (¹QEP Resources, Inc.; ²GeoMark Research)
- **Applied Petroleum Source Rock Evaluation and High-Resolution Sequence Stratigraphy of La Luna Formation, Venezuela: Integrating for Finding the Unconventional Sweet Spots:** A. D. Liborius-Parada, R. M. Slatt, R. P. Philp (The University of Oklahoma)

09B. Reserves Estimation and Production Forecasting II: Performance Prediction and Future of Production Forecasting

Co-Chairs: U. Ahmed, S. Howes, and G. Gupta

- **Consistent EUR Forecast in Permian Multi-Phase Unconventional Reservoirs with Pressure Normalized Rate Method:** X. Xie, S. Liu (Occidental Petroleum)
- **Using Dynamic Modeling to Correct Decline Curve for Liquid-Rich Shale Reservoirs:** C. Chen¹, X. Liu², A. Girardi¹, A. McMullen¹, G. Gao³, S. Bhattacharya¹, R. Cao¹, N. Chowdhury¹ (¹Shell Exploration and Production Company; ²Shell International Exploration and Production; ³Shell Global Solutions US Inc.)
- **Flow Regime-Based Decline Curve for Unconventional Reservoirs: Generalization to Anomalous Diffusion and Power Law Behavior:** V. Artus, O. Houze (KAPPA Engineering)
- **Application of Machine Learning for Production Forecasting for Unconventional Resources:** C. Zhan, S. Sankaran, V. LeMoine, J. Graybill (Anadarko Petroleum Corporation)
- **Multiphase Production Data Analysis for Shale and Tight Reservoirs Using the Diffusive Diagnostic Function:** Y. Zhang, C. Yang, J. He, Z. Wang, J. Xie, X-H. Wen (Chevron ETC)
- **Modified Fetkovich Type Curve Enhances Type Well Construction for Horizontal Wells with Multiple Fractures:** A. C. Elliott, J. Lee* (Texas A&M University)
- **Empirical Workflow for Predicting Infill Performance in the Marcellus:** A. Chin¹, D. S. Jones², L. Lasecki², S. Rivera Barraza², K. McBride², H. Behmanesh¹, D. M. Anderson¹, A. Staruiala¹, C. Alonzo¹ (¹NCS Multistage; ²Chesapeake Energy)

10B. Pressure Transient Testing, DFIT, and Well Testing

Co-Chairs: K. Srinivasan and N. Bansal

- **A Collaborative Study on Interpretation of Diagnostic Fracture Injection Tests: Integrating Modeling, Field Data, and Analytical Calculations:** M. McClure¹, C. Cipolla², D. Cramer³, L. Martin^{4,5}, A. Savitski⁶ (¹ResFrac Corporation; ²Hess Corporation; ³ConocoPhillips; ⁴Apache Corporation (former); ⁵Marathon Oil Corporation; ⁶Shell Exploration and Production Company)

- **Quantifying Total Apparent Hydraulic Fracture Conductivity and Its Significant Degradation from Systematic Bottom-Hole Pressure Measurements in Permian Wells:** L. Zhan¹, A. Tokan-Lawal¹, P. Fair¹, R. Dombrowski¹, X. Liu¹, V. Almaraz², A. Girardi², Z. Li², R. Li², M. Pilko² (¹Shell International Exploration and Production; ²Shell Exploration and Production Company)
- **Diagnosing Multi-Cluster Fracture Geometry Using Dynamic Poroelastic Pressure Transient Analysis:** P. Seth¹, R. Manchanda¹, B. Elliott², M. Sharma¹ (¹The University of Texas at Austin; ²Devon Energy)
- **Let's Combine Well Testing and Logging: A Pre- and Post-Frac Gas Shale Case:** A. Jacques¹, B. Brouard², V. Jaffrezic¹, S. Manivannan³, P. Berest³ (¹TOTAL SA; ²Brouard Consulting; ³École Polytechnique)
- **Post-Fracture Pressure Decay—A Novel Stage Level Reservoir Quality Measurement:** M. J. Sullivan¹, B. Zanganeh² (¹Chevron; ²University of Calgary)
- **Fully 3-D Simulation of Diagnostic Fracture Injection Tests with Application in Depleted Reservoirs:** S. Zheng, R. Manchanda, H. Wang, M. M. Sharma (The University of Texas at Austin)
- **Evaluation of Water Hammer Analysis as Diagnostic Tool for Hydraulic Fracturing:** X. Ma, F. Zhou, J. A. Ortega Andrade*, S. V. Gosavi, D. Burch (ExxonMobil Upstream Research Company)

Exhibit Hall

02F. Advanced Formation Evaluation VI: Nuclear Magnetic Resonance, Permeability, and Recovery

Co-Chairs: L. Sivila, A. Mitra, and H. Wang

- **Impact of Thermal Maturity and Rock Types on Water Production in Organic-Rich Mudrocks:** A. Jagadisan, Z. Heidari* (The University of Texas at Austin)
- **Nuclear Magnetic Resonance Estimation of Petrophysical Properties and Evaluation of Hydrocarbon Huff-and-Puff Gas Injection in Lower Eagle Ford Shale Oil Samples:** S. Cudjoe¹, R. Barati¹, J-S. Tsau¹, C. Zhang¹, B. Nicoud², K. Bradford², A. Baldwin², D. Mohrbacher² (¹University of Kansas; ²Chesapeake Energy)
- **Mechanistic Analysis of Shale Permeability Evolution Data:** R. Shi¹, J. Liu², D. Elsworth³ (¹China University of Geosciences; ²The University of Western Australia; ³The Pennsylvania State University)
- **Modeling Mineralogy and Total Organic Carbon (TOC) from X-ray Fluorescence (XRF) Elemental Data for Improved Formation Evaluation in the Powder River Basin:** N. R. Hart, M. C. Dix, P. Mainali, H. D. Rowe, A. Morrell, H. Garza (Premier Oilfield Group)
- **Formation Stabilization—Is Bigger Better in Cationic Polymers?:** D. N. Benoit, K. Henkel-Holan*, M. Brown, R. Morgan, M. McCabe (Halliburton)

03E. Depositional Processes of Unconventional Reservoirs

Co-Chairs: A. Grau and A. Tokan-Lawal

- **Understanding 3-D Distribution of Organic-Rich Units in the Vaca Muerta Formation:** R. F. Dominguez, M. Di Benedetto (YPF SA)
- **Sweet Spot Identification and Mapping for Stacked, Distal Bottomset Deposits, Vaca Muerta Formation, Neuquén Basin, Argentina:** R. Notta (Shell Exploration and Production Company)
- **Impact of Geological Processes on Reservoir Heterogeneity in Tight Reservoirs:** S. C. Iwuoha, P. K. Pedersen (University of Calgary)
- **Stratigraphic Architecture of the Bone Spring Formation (Leonardian), Delaware Basin, New Mexico and Texas: An Interim Report:** D. L. Carr (The University of Texas at Austin)
- **Petrophysical Rock Typing in Unconventional Shale Plays: The Niobrara Formation Case Study:** A. Kamruzzaman, M. Prasad, S. Sonnenberg (Colorado School of Mines)



- **Leveraging Regional Geology and Sequence Stratigraphic Concepts at the Field and Reservoir Scale: Building More Reliable Earth Models Under Sparse Data Conditions:** K. Evans, J. Yarus, E. Mohsenian, J. Montero, J. Zhang (Halliburton)

- **Experimental Study of Proppant Transport in Complex Fractures with Horizontal Bedding Planes for Slickwater Fracturing:** T. Chun, Z. Zhang, K. Wu (Texas A&M University)

07E. Machine Learning, AI, and Big Data V

Co-Chairs: T. Firincioglu and C. Dai

- **Empowering Completion Engineers to Calibrate Petrophysical Facies Models to Hydraulic Fracturing Treatment Responses:** C. Glaser, J. Mazza, J. Frame (Fracture ID)
- **An Effective Physics-Based Deep Learning Model for Enhancing Production Surveillance and Analysis in Unconventional Reservoirs:** Y. Pan, R. Bi, P. Zhou, J. Lee (Texas A&M University)
- **Demystifying Data-Driven Neural Networks for Multivariate Production Analysis:** A. Rastogi¹, K. Agarwal², E.OLON², M. Mayerhofer², O. Oduba² (¹Colorado School of Mines; ²Liberty Oilfield Services)
- **Ensemble Learning: A Robust Paradigm for Data-Driven Modeling in Unconventional Reservoirs:** S. Mishra, J. Schuetter (Battelle Memorial Institute)
- **Production and Injection Optimization in a Geothermal Reservoir Using Artificial Intelligence:** A. Takbiri-Borujeni, E. Fathi, M. Gu (West Virginia University)
- **Machine Learning Regression Techniques to Predict Synthetic Sonic and Identify Brittle Zones:** I. Gupta, D. Devegowda, V. Jayaram, C. Rai, C. Sondergeld (University of Oklahoma)

10E. Shale Facilities and Artificial Lift Optimization

Chair: T. Mallinson

- **The Impact of Extended Lateral Length and Wellbore Trajectories on Liquid Loading in Unconventional Horizontal Wells:** A. Agreda, B. Gokcal, T. Danielson, J. Petrilli, S. Agrawal, H. Patrikno, B. Hearn, J. Allwardt (ConocoPhillips)
- **Flow Regulation in Horizontal Wells: Evaluating a Tailpipe System Designed to Optimize Artificial Lift Performance in Horizontal Wells:** N. B. Dye¹, D. Kimery², C. Gallo¹ (¹ConocoPhillips; ²Heal Systems)
- **Production Modeling for Velocity String Applications in Unconventional Wells:** A. S. Bagci, T. Chang (Baker Hughes, a GE Company)
- **Modeling and Application of Annular-Velocity Enhancement System in Unconventional Horizontal Wells:** B. Gokcal, A. Agreda, J. Allwardt, B. Hearn, K. Frieauf, J. Constantine, M. Sevilla, D. Morrow, S. Andrus, C. Loehr (ConocoPhillips)
- **Optimizing Gas Lift in the Lateral and Bend Sections of Horizontal Shale Wells:** A. S. Nagoo (Nagoo & Associates LLC)
- **Analytical and Numerical Studies of Sand Erosion in Electrical Submersible Pump (ESP) Systems:** S. Gomez Diaz de Bonilla, H-Y. Chen (New Mexico Institute of Mining and Technology)

11C. Proppant Transport and Novel Technologies

Co-Chairs: N. Moridis and Y. Liu

- **Roles of Adsorption and Geomechanics in Development of a Shale Condensate Reservoir:** S. Yang, Z. Chen (University of Calgary)
- **Design of High-Pressure Carbon Dioxide-, Nitrogen- and Methane-in-Mineral Oil Foams Stabilized by Novel Oil-Soluble Surfactants for Waterless Hydraulic Fracturing:** S. Alzobaidi¹, G. Rodriguez², P. Lemaire², C. Lu¹, R. Enick², K. Johnston¹ (¹The University of Texas at Austin; ²University of Pittsburgh)
- **An Efficient Three-Dimensional Multiphase Particle-in-Cell Model for Proppant Transport in the Field Scale:** S. Mao, S. Zhi, K. Wu (Texas A&M University)
- **An Experimental Investigation of Proppant Transport in High Loading Friction-Reduced Systems Utilizing a Horizontal Wellbore Apparatus:** F. A. Ahmad, J. L. Miskimins (Colorado School of Mines)
- **Proppant Transport Performance Using High Viscosity Friction Reducers in a Scaled Complex Hydraulic Fracture System:** M. Ba Geri¹, A. Imqam¹, A. Bogdan² (¹Missouri University of Science and Technology; ²BJ Services)

Tuesday Afternoon

Session Rooms

Special Session: Hydraulic Fracture Test Site (HFTS)

Please see page 12 for more information on this special session.

- **Natural Fracture Characterization in the Wolfcamp Formation at the Hydraulic Fracture Test Site (HFTS), Midland Basin, Texas:** J. F. W. Gale, S. J. Elliott, J. Z. Li, S. E. Laubach (University of Texas at Austin)
- **Analysis and Interpretations of Pressure Data from the Hydraulic Fracturing Test Site (HFTS):** T. Li, W. Chu, P. A. Leonard (Pioneer Natural Resources)
- **Seismic Monitoring at the Hydraulic Fracturing Test Site (HFTS), Midland Basin, Texas:** A. Kumar¹, H. Hu², R. Hammack¹, A. Bear³, W. Harbert³ (1. National Energy Technology Laboratory; 2. Department of Earth and Atmospheric Sciences, University of Houston; 3. National Energy Technology Laboratory/Department of Geology and Environmental Science, University of Pittsburgh)

01E. Operators' Forum: Case Studies Highlighting Modeling and Technologies

Co-Chairs: Y. Pradhan, D. S. Jones, and F. Tovar

- **Hydraulic Fracture Modeling and Innovative Fracturing Treatment Design to Optimize Perforation Cluster Efficiency, Lateral Placement, and Production Results in a Mancos Shale Gas Appraisal Well:** S. W. French¹, I. Gil², C. Yuan², K. Cawiezel², D. Schoderbek¹ (¹BPX Energy; ²BP)
- **Using a Metamodel-Based Approach for Optimization of Stimulated Rock Volume Geometry, Hydrocarbon Production, and Related Field Development Costs:** H. Pourpak¹, J. Will², N. Mottet¹ (¹TOTAL SA; ²Dynardo)
- **Using a Coupled Hydraulic Fracture and Reservoir Simulator to Drive Landing Zone Optimization:** D. R. Ratcliff¹, M. McClure², R. Johnson¹, J. Reed¹ (¹QEP Resources, Inc.; ²ResFrac Corporation)
- **Practical Reservoir Simulation for Small Development Teams—Customizing Stimulation Designs by Landing Zone in the Midland Basin:** T. Tran, R. Miller, B. Pottebaum, B. McDowell, A. Yoelin, L. Steinke, A. Southcott (Discovery Natural Resources)
- **A Data-Driven Modeling Methodology to Support Unconventional Reservoir Development Decisions: Application to the STACK Play in Oklahoma:** M. Burton, S. Matringe, T. Atchison, M. Taing, M. Houser (Newfield Exploration)
- **Uncertainties in Step-Down Test Interpretation for Evaluating Completions Effectiveness and Near-Wellbore Complexities:** S. Mondal¹, G. Ugueto², P. Huckabee², M. Wojtaszek³, T. Daredia⁴, S. Vitthal², D. Nasse² (¹Shell International Exploration and Production; ²Shell Exploration and Production Company; ³Shell Global Solutions International; ⁴Shell Canada Limited)

02D. Advanced Formation Evaluation IV: Saturation, Volumes, and Recovery

Co-Chairs: K. Yared, L. Jin, and J. Raftery

- **Saturation Isn't What It Used to Be: Towards More Realistic Petroleum Fluid Saturations and Produced Fluid Compositions in Organic-Rich Unconventional Reservoirs:** A. S. Pepper¹, S. Perry², L. Heister² (¹This is Petroleum Systems LLC; ²Anadarko Petroleum Corporation)
- **Evaluation of the Impact of Water Saturation on Hydrocarbon Production from Organic-Rich Shale Reservoirs:** A. Tinni, C. Sondergeld, C. Rai (University of Oklahoma)
- **Quantifying the Impacts of Competitive Adsorption of Kerogen and Clay Minerals on Wettability of Organic-Rich Mudrocks:** A. Jagadisan, Z. Heidari* (The University of Texas at Austin)

TUESDAY TECHNICAL PROGRAM

- **Scale-Dependent Correlation to Improve Water Saturation and Permeability Estimates in Unconventional Reservoirs:** A. Kotb, S. L. Eichmann*, M. Sengupta (Aramco Services Company)
- **Assessment of Improved Oil Recovery by Osmotic Pressure in Unconventional Reservoirs: Application to Niobrara Chalk and Codell Sandstone:** O. Uzun, H. Kazemi (Colorado School of Mines)
- **Recovering Oil from Oil-Wet Nanopores Using Mixed Surfactant Solutions:** A. Habibi, H. Dehghanpour (University of Alberta)
- **A Pore-Scale Mechanistic Investigation of Shale Gas Condensate at Near Saturation Pressure on Fluid Flow in Shale:** S. Pan¹, J. Ma², J. Y. Zuo³, N. Hamed¹ (¹Schlumberger; ²Heriot-Watt University; ³Fluid Modeling Group)

03C. Imaging Unconventional Reservoir Rocks at Various Scales

Co-Chairs: T. Olson and R. Denne

- **Visualization of Pore Connectivity Using Mercury Injection Capillary Pressure Measurements, Micro X-ray Computed Tomography, and Cryo-Scanning Electron Microscopy:** M. E. Curtis, C. H. Sondergeld, C. S. Rai (University of Oklahoma)
- **Relative Permeability Upscaling in Porosity Systems with Under-Resolved Features Using Image-Based Rock Physics:** J. J. Howard¹, A. Byrnes², S. Zhang¹ (¹DigiM Solution; ²Whiting Petroleum Corporation)
- **Semi-Quantitative SEM Analysis of the Vaca Muerta Formation and Its Impact on Reservoir Characterization, Neuquen Basin, Argentina:** F. Gonzalez Tomassini¹, L. B. Smith Jr.², M. G. Rodriguez¹, I. Jausoro³, M. A. Floridia³, M. Cipollone³, A. Caneiro³, G. Sagasti¹ (¹YPF SA; ²SmithStrata; ³YPF Tecnologia SA [Y-TEC])
- **Imaging Microcrystalline Quartz in a Sandstone Reservoir to Understand the Formation of Microcrystalline Quartz in the Wolfcamp A Siliceous Mudstones, Southern Delaware Basin:** M. W. French, J. Colborne (Colorado School of Mines)
- **Unconventional Reservoir Microstructural Analysis Using SEM and Machine Learning:** A. S. Knaup, J. D. Jernigen, M. E. Curtis, J. W. Sholeen, J. J. Borer, C. H. Sondergeld, C. S. Rai (University of Oklahoma)
- **Integration of Microfacies Analysis, Inorganic Geochemical Data, and Hyperspectral Imaging to Unravel Mudstone Depositional and Diagenetic Processes in Two Cores from the Triassic Shublik Formation, Northern Alaska:** K. J. Whidden¹, J. E. Birdwell^{1*}, J. A. Dumoulin¹, L. C. Fonteneau², B. Martini² (¹U.S. Geological Survey; ²CoreScan Pty Ltd)
- **Continuous Mineral Mapping of Core Using Hyperspectral Imaging: Example from the Upper Cretaceous Austin Chalk Marathon 1 Robert Todd Core, Central Louisiana:** T. Kosanke¹, R. Loucks², T. Larson², P. Linton³, J. Greene¹ (¹ALS Oil and Gas Laboratories; ²Jackson School of Geosciences, The University of Texas at Austin; ³Terracore)

05E. Rock Characterization for Fracturing and Drilling

Co-Chairs: J. Kessler, N. Park, and Y. Fang

- **Experimental Study of Fracture Permeability with and Without Proppants on Vaca Muerta Gas Shale:** K. Su¹, Y. Sanz Perl², P. Barlet¹, H. Pourpak¹ (¹TOTAL SA; ²TOTAL Austral)
- **Triaxial Direct Shear Fractured Marcellus Shale—Peak and Residual Shear Strength, Permeability, and Hydroshear Potential:** N. J. Welch, L. P. Frash, J. W. Carey (Los Alamos National Laboratory)
- **Assessing the Stratigraphic and Spatial Variations in Geomechanical Properties of the United Kingdom Bowland Shale Using Wireline and Seismic Data: How Could These Guide the Placement of Lateral Wells?:** I. Anderson¹, J. Ma¹, X. Wu², D. Stow¹ (¹Heriot-Watt University; ²British Geological Survey)
- **Geomodeling as a Tool for Optimizing Completions in the Montney Formation:** J. A. Nieto, B. Batlai, H. Martinez, G. Janega (Canbriam Energy)
- **Impact of Natural Fracture-Induced Elastic Anisotropy on Completion and Frac Design in Different Shale Reservoirs:** E. C. Dundar, A. Alhemdi, M. Gu* (West Virginia University)

- **High-Resolution Geomechanical Property Characterization at Core Scale: Combining Continuous and Discrete Measurements to Improve Mechanical Earth Model Calibration in the Vaca Muerta Formation, Argentina:** A. Padin (Total Exploration & Production)

07A. Machine Learning, AI, and Big Data I

Co-Chairs: S. Carpenter and D. Zhou

- **Development and Application of a Real-Time Drilling State Classification Algorithm with Machine Learning:** Y. Ben, C. James, D. Cao (Anadarko Petroleum Corporation)
- **Cloud-Based ROP Prediction and Optimization in Real Time Utilizing Supervised Machine Learning:** K. Singh, S. S. Yalamarty, M. Kamyab, C. Cheatham (Corva AI, LLC)
- **An Integrated Machine Learning Framework for Optimizing Unconventional Resources Development:** H. Zhou, B. Lascaud (ConocoPhillips)
- **Large-Scale Analytics for Unconventional Development Using Pressure Based Fracture Map Data:** D. Lerohl, S. Kashikar, E. Coenen (Reveal Energy Services)
- **Reservoir Fluid Log Based on Advanced Mud Gas Data in Shale Reservoirs:** T. Yang, I. H. Arief, M. Niemann (Equinor ASA)
- **Improving Field Development Decisions in the Vaca Muerta Shale Formation by Efficient Integration of Data, AI, and Physics:** H. Klie¹, A. Klie¹, A. Rodriguez², J. Monteagudo², A. Primera³, M. Quesada³ (¹DeepCast.ai; ²OpenSim Technology; ³Primera Resources)
- **Unsupervised Machine Learning Applications for Seismic Facies Classification:** S. Chopra (TGS Canada)

08B. EOR in the Permian Basin

Co-Chairs: M. Manohar and X. Li

- **A Set of Successful Chemical Enhanced Oil Recovery Trials in Permian Basin: Promising Field and Laboratory Results:** M. Moradi Bidhendi, M. Kazempour, U. Ibanga, D. Nguyen, M. Lantz, C. Mazon, B. B. Alamdari (Nalco Champion, An Ecolab Company)
- **Assessment of Rich Gas EOR and the Effect of Enrichment on the MMP Values in the Wolfcamp:** I. Adel, D. Schechter (Texas A&M University)
- **A Novel Bio-Approach for Unconventional Reservoir EOR Through Remediation of Formation Damage Caused by Fracturing Fluid Additives:** J. X. Jin, P. Zhao (New Aero Technology LLC)
- **Application of Miscible Ethane Foam for Gas Conformance in Low-Permeability Heterogeneous Harsh Environments:** M. Salman, K. Kostarelos, P. Sharma, J. H. Lee (University of Houston)

08C. Gas Injection EOR

Co-Chairs: M. Manohar and X. Li

- **Application of Huff-and-Puff EOR in the Liquids-Rich Portion of the Montney Play: Effect of Solvent Composition:** J. A. Rivero, G. Garcia Ferrer, M. Faskhoodi, H. Mukisa (Schlumberger Canada)
- **Laboratory Studies of Rich Gas Interactions with Bakken Crude Oil to Support Enhanced Oil Recovery:** S. Hawthorne¹, J. Sorensen^{1*}, D. Miller¹, C. Gorecki¹, J. Harju¹, G. Pospisil² (¹University of North Dakota Energy & Environmental Research Center; ²Liberty Resources LLC)
- **Chemical Blend CO₂ Huff-and-Puff for Shale Oil EOR:** K. Mohanty, T. Zeng, C. Miller (The University of Texas at Austin)

10C. Reservoir Modeling for Unconventionals: Bringing Together Data, Disciplines, and Design

Co-Chairs: A. Martinez and J. McLaughlin

- **Anomalous Diffusion or Classical Diffusion in an Anomalous Reservoir? Evaluation of the Impact of Stress-Dependent Reservoir Properties and Multi-Phase Flow on Reservoir Signatures in Unconventional Reservoirs:** C. Clarkson¹, B. Yuan¹, Z. Zhang¹, D. Anderson², J. Thompson², D. Loughheed² (¹University of Calgary; ²NCS Multistage)



- **Multi-Resolution Grid Connectivity-Based Transform for Efficient History Matching of Unconventional Reservoirs:** H. Kim¹, F. Olalotiti-Lawal², A. Datta-Gupta¹ (¹Texas A&M University; ²Quantum Reservoir Impact)
- **Cluster Interfering and Distinguishing Influences of Hydraulic Fracturing Completion Strategies on Production Rates in Unconventional Reservoirs Combining Numerical Simulation (DSRV) and Analytics:** L. Ji, V. Sen, K. Min, R. Sullivan (Anadarko Petroleum Corporation)
- **An Efficient Method for Modeling Discrete Fracture Networks in Geomechanical Reservoir Simulations:** A. Kumar, K. Shrivastava, R. Manchanda, M. M. Sharma (The University of Texas at Austin)
- **Workflow Development and Sensitivity Investigation of Offset Well-to-Well Interference Through 3-D Fracture Modeling and Reservoir Simulation in the Denver-Julesburg Basin:** T. H. Levon, J. Miskimins (Colorado School of Mines)
- **Stochastic Understanding About the Dynamic Behavior of SRV/DRV and Applications to Unconventional Field Development Decisions:** R. Cao (Shell Exploration and Production Company)
- **A Direct Method for Short-Term Forecasting of Multi-Phase Production Rates Using Flowback Data:** M. R. Jones¹, B. Bajgier¹, T. Blasingame² (¹Anadarko Petroleum Corporation; ²Texas A&M University)

11A. Proppant Placement and Novel Completion Technologies

Chair: T. Mallinson

- **The Development of a New Laboratory Technique to Monitor the Consolidation Process of Control Additives During Propped Hydraulic Fracturing Treatment:** M. H. Alqam, A. H. Al-Makrami, E. T. Caliboso (Saudi Aramco)
- **Geophysical Monitoring with Seismic Metamaterial Contrast Agents:** Q. R. Miller, T. Schaeff, S. K. Nune, K. W. Jung, K. M. Denslow, M. S. Prowant, P. F. Martin, J. A. Burghardt, C. E. Strickland, P. McGrail (Pacific Northwest National Laboratory)
- **Far-Field Proppant Imaging: A STACK Case History:** R. Barber¹, K. Haustveit¹, T. Palisch² (¹Devon Energy; ²Carbo Ceramics)
- **Tracer Eluting Proppants for Shale Fracturing:** K. Mohanty, B. Zhao, K. Panthi (The University of Texas at Austin)
- **Quasi-Dry CO₂ Fracturing—A New Breakthrough of Dry CO₂ Fracturing:** L. Jin¹, Y. Zheng² (¹BrightGold Consulting LLC; ²APPolymer Technology)
- **High Performance Fracturing Fluid Diverters with Broad Spectrum Applicability:** D. Dreyer¹, P. Kurian¹, T. Hu¹, P. Tonmukayakul¹, R. Calaway², C. Hodges², K. Peoples² (¹Nalco Champion, An Ecolab Company; ²Quintana Energy Services)
- **Novel Wettability Modifiers for Improved Oil Recovery in Tight Oil Reservoirs:** M. Wang, R. A. Lara Orozco, G. A. Abeykoon, F. J. Argüelles Vivas, R. Okuno* (The University of Texas at Austin)

Exhibit Hall

02H. Advanced Formation Evaluation VIII: Integration of Geomechanics in Petrophysical Analysis

Co-Chairs: K. Hartig and M. Ashby

- **Petrophysical Evaluation of Geomechanical Data in a Horizontal Well Predicts Problem Stages Using Process Zone Stress:** T. Levon, C. Glaser (Fracture ID)
- **Characterization of Subsurface Bedding Parallel Shear Fractures and Their Influence on Shale Gas Enrichment in the Wufeng-Longmaxi Formation:** P. Feng¹, J. Liwei², N. Wei², S. Dongchu² (¹Schlumberger; ²PetroChina Zhejiang Oilfield Company)

- **Multi-Scale Integration of Mudstone Properties in Interbedded Reservoirs, Insights into Additional Criteria for Evaluating Unconventional Reservoirs: Examples from the Duvernay Formation (Alberta, Canada) and the Woodford Shale (Oklahoma, USA):** H. Galvis-Portilla¹, D. Becerra-Rondon¹, P. K. Pedersen¹, R. Slatt² (¹University of Calgary; ²University of Oklahoma)
- **Elastic Mechanical Properties from SEM Imaging in Tight Formations:** J. Walls¹, J. Dvorkin² (¹Halliburton; ²Consultant)
- **Using High Resolution Geomechanical Data and Machine Learning to Inform Drilling Decisions and Completions Operations in the Wolfcamp, Delaware Basin:** J. Edwards, C. Glaser, E. Romberg (Fracture ID)
- **Pore Pressure Estimation in Complex Lithologies: A Novel Approach in Delaware Basin Wolfcamp:** A. Popielski (ConocoPhillips)
- **X-Ray Fluorescence and Laser-Induced Breakdown Spectroscopy for Advanced Rock Elemental Analysis:** H. Han, S. Dang, J. Acosta, C. Sondergeld, C. Rai (University of Oklahoma)
- **Thin Section Organic Matter Analyses with Raman Microscopy:** G. A. Myers¹, D. M. Homan² (¹WellDog; ²Schlumberger)

04D. Novel Techniques in Geophysics for Reservoir Characterization

Co-Chairs: J. Rich and S. Wright

- **The Calibration of Double-Ended Distributed Temperature Sensing for Production Logging Purposes:** G. Jin, B. Roy, K. Frieauf (ConocoPhillips)
- **Analytical Approach for Injectivity Profiling Through Warm-Back Analysis in Multilayer Reservoirs:** R. G. Hashish, M. Zeidouni (Louisiana State University)
- **Two Inversion Case Studies from the SCOOP and STACK Area of Oklahoma:** S. Chopra (TGS Canada)
- **Workflow for Nonlinear AVO Inversion to Estimate Seismic Anisotropy and Geomechanical Properties of Shale:** U. Y. Lim, R. L. Gibson, N. Kabir (Texas A&M University)
- **Shallow Velocity Model Building Considerations for Pre-Stack Depth Migration in Unconventionals:** M. Perz, J. Heim, C. Bruins (TGS)
- **Resonance Frequencies in Passive Recordings Map Fracture Systems: Eagle Ford and Albany Shale Examples:** C. J. Sicking, J. Vermilye (Ambient Reservoir Monitoring)

05G. Frac Modeling III: From Physics to Field

Co-Chairs: K. Wu and E. Dontsov

- **3-D Modeling of Hydraulic Fracture Propagation in Naturally Fractured Reservoirs:** A. Kamali, A. Ghassemi (The University of Oklahoma)
- **Optimizing Proppant Placement in Rough-Walled Rock Fractures:** M. Zhang¹, M. Mirabolghasemi², M. Prodanović¹ (¹The University of Texas at Austin; ²Mississippi State University)
- **Fracture Surface Area Estimation from Main Hydraulic Fracture Treatment Pressure Falloff Data:** G. Liu¹, T. Zhou², C. Ehlig-Economides¹ (¹University of Houston; ²Sinopec)
- **Rapid Modeling of Injection and Production Phases of Hydraulically Fractured Shale Wells Using the Fast Marching Method:** J. Park¹, A. Iino¹, A. Datta-Gupta¹, J. Bi², S. Sankaran² (¹Texas A&M University; ²Anadarko Petroleum Corporation)
- **Fracture Analysis Before and After Hydraulic Fracturing in the Marcellus Shale Using the Mohr-Coulomb Failure Criterion:** N. Bannikova, K. G. Evans, T. M. Ore, J. T. Smith, R. T. Toth*, T. R. Carr, P. K. Ghahfarokhi (West Virginia University)
- **Bayesian Probabilistic Analysis to Quantify Uncertainties in Hydraulic Fracture Geometry—Application to Laminations and Their Impact on Fracture Height:** M. Paryani, A. Ouenes (FracGeo)
- **Simulating the Life of Hydraulically Fractured Wells Using a Fully-Coupled Poroeastic Fracture-Reservoir Simulator:** R. Manchanda, S. Zheng, D. Gala, M. M. Sharma (The University of Texas at Austin)

TUESDAY TECHNICAL PROGRAM

06D. Geochemistry of Oil-Prone and Gas-Prone Unconventional Resource Plays

Co-Chairs: S. Macalello and D. Ebnother

- **Unconventional Potential of the Crazy Mountain Basin, Montana:** G. Zimbrick (Dolan Integration Group)
- **The Role of Volcanic Ash in Promoting and Suppressing Organic Matter Accumulation in Lacustrine Mixed Sediments in the Permian Jimsar Sag, Junggar Basin:** X. Ding (China University of Petroleum)
- **Effective Source Rocks in Rocky Mountain Late Cretaceous Petroleum Systems:** M. P. Dolan, G. Zimbrick, S. Hodgetts, P. Travers (Dolan Integration Group)
- **Laser-Induced Breakdown Spectroscopy (LIBS): An Emerging Spectroscopic Technique for Shale Rock Characterization:** J. C. Jain, D. A. Hartzler, D. L. McIntyre, J. E. Moore, D. M. Crandall (USDOE National Energy Technology Laboratory)
- **Variability in Results from Mineralogical and Organic Geochemical Interlaboratory Testing of U. S. Geological Survey Shale Reference Materials:** J. E. Birdwell, S. A. Wilson (U.S. Geological Survey)
- **Origin of Shale Gases from Around the World: Implication for Exploration:** A. V. Milkov¹, G. Etiope² (¹Colorado School of Mines; ²Istituto Nazionale di Geofisica e Vulcanologia)
- **Application of Raman Spectroscopy in Investigating the Effect of Source and Temperature on the Maturity of the Organic Matter Exposed to Hydrocarbon Gas Injection:** S. Cudjoe¹, R. Barati¹, C. P. Marshall¹, R. H. Goldstein¹, J-S. Tsau¹, B. Nicoud², K. Bradford², A. Baldwin², D. Mohrbacher² (¹University of Kansas; ²Chesapeake Energy)
- **Heterogeneity of STACK/SCOOP Production in the Anadarko Basin, Oklahoma—Geochemistry of Produced Oils:** C. Symcox, R. P. Philp (University of Oklahoma)

08E. Pore-Network Imaging and Modeling to Understand Fluid Flow

Co-Chairs: V. Artus and L. Baez

- **Water/Oil Displacement by Spontaneous Imbibition Through Multiscale Imaging and Implication on Wettability in Wolfcamp Shale:** S. Peng¹, Y. Liu², L. T. Ko¹, W. Ambrose¹ (¹The University of Texas at Austin; ²SLAC National Accelerator Laboratory)
- **An Integrated Pore-Scale Characterization Workflow for Hydrocarbon Gas Huff-and-Puff Injection into the Lower Eagle Ford Shale:** S. Cudjoe¹, R. Barati¹, R. H. Goldstein¹, J-S. Tsau¹, B. Nicoud², K. Bradford², A. Baldwin², D. Mohrbacher² (¹University of Kansas; ²Chesapeake Energy)
- **Kerogen-Bitumen-Porosity Nexus: Insights from Multi-Basinal Collocated SEM-Optical Light Petrography:** S. Kelly¹, M. Johnston¹, B. Lee², R. San Martin³ (¹ConocoPhillips; ²Innova Plex; ³FIB-X)

08F. Enhanced Gas Recovery Methods in Unconventionals

Co-Chair: V. Artus and L. Baez

- **The Effect of Microwave Irradiation on Coal for Enhanced Gas Recovery of Coalbed Methane:** J. Zhu^{1,2}, Z. Yang¹, X. Li¹, Y. Li¹, (¹Southwest Petroleum University; ²The University of Texas at Austin)
- **Permeability Enhancement in Gas Shale Due to Nitrogen Flooding:** B. Schwartz, D. Elsworth (The Pennsylvania State University)
- **Streamline Assisted Study of Gas Transport Mechanisms and Drainage Area for Fractured Shale Gas Reservoirs:** W. Yu¹, L. Zuo², J. Miao² (¹The University of Texas at Austin; ²SimTech LLC)
- **In Situ Logs of Gas Composition of CO₂-ECBM Trial in Buchanan County, Virginia, with Downhole Reservoir Raman System:** G. Myers¹, A. Cookman¹, N. Ripepi² (¹WellDog; ²Virginia Polytechnic Institute and State University)



Wednesday Morning

Session Rooms

Special Session: ARMA—Principles, Simulation, and Practice

Chair: J. McLennan

Please see page 13 for more information on this special session.

- **Implications of Experiments and Simulations for the Multi-objective Optimization of Horizontal Well Completions:** A. Bunger¹, C. Cheng¹, D. Gunaydin¹, A. Peirce² (1. University of Pittsburgh; 2. University of British Columbia)
- **The Role of Perforations in Balancing Stress Variations Along the Lateral During Plug-and-Perf Treatments:** D. Cramer (ConocoPhillips)
- **SRV Versus Hydraulic Fracture Geometry: Are Mixed-Mode Fractures the Missing Link?:** R. Hurt (Pioneer Natural Resources)
- **Mixed-Mechanism Stimulation in Geothermal Reservoirs:** J. Norbeck (Fervo Energy)

Panel: Next Technology Frontier in Unconventionals—What's Needed Versus What's in Development

Please see page 14 for more information on this panel.

01F. Operators' Forum: Case Studies from Geology to Completions

Co-Chairs: B. Driskill and M. Handke

- **Starting Development in an Unconventional Play in Argentina: The Road to First FID:** E. Kruijs, P. Fita, Y. Gonzalez, H. Mandler (Shell International Exploration and Production)
- **Tailoring Completion Design to Reservoir and Geologic Quality Changes Across the Uinta Basin:** T. S. Ong, J. Reamer, J. Lassek, M. Quakenbush (Newfield Exploration)
- **Analysis of a Drained Rock Volume: An Eagle Ford Example:** K. Raterman, Y. Liu, L. Warren (ConocoPhillips)
- **Delaware Basin Horizontal Wolfcamp Case Study: Mitigating H₂S and Excessive Water Production Through Isolating Densely Fractured Intervals Correlative to Seismically Mapped Shallow Graben Features in the Delaware Mountain Group:** K. Charzynski¹, K. Faith¹, Z. Fenton^{*1}, M. McKee², S. Bjorlie², M. Richardson² (1. Upcurve Energy LLC; 2. Jetta Permian, LP)

02E. Advanced Formation Evaluation V: Data Integration and Modeling

Co-Chairs: A. Duncan and S. Borchardt

- **Accurate Rock Mineral Characterization with Nuclear Magnetic Resonance:** H. Wang, B. Sun, Z. Yang, S. Seltzer, M. Wigand (Chevron Corporation)
- **Facies-Calibrated Petrophysical and Geocellular Property Modeling Using Data Analytics and Multi-Point Statistics in the Delaware Basin, USA:** M. Lessenger¹, T. Gladchenko², J. Hardt³, M. Houston³ (1. Rimrock Petrophysics and Analytics, LLC; 2. Applied Geostats, LLC; 3. Piedra Companies)
- **Combined Inversion Recovery and CPMG NMR Interpretation Method for More Accurate Quantification of Liquid Saturations in Organic-Rich Mudstones:** R. L. Krumm, J. J. Howard (Premier Oilfield Group)
- **Compositional Controls on Micro-Scale Fluid Distribution in Tight Rocks: Examples from North American Liquid-Rich Reservoirs:** D. J. Cronkwright, C. R. Clarkson, C. DeBuhr, C. Song, H. J. Deglint, A. Ghanizadeh* (Department of Geoscience, University of Calgary)
- **An Integrated Deep Learning Solution for Petrophysics, Pore Pressure, and Geomechanics Property Prediction:** E. Zabihi Naeni¹, S. Green¹, M. Rauch-Davies² (1. Ikon Science; 2. Devon Energy)

- **Enhanced Reservoir Characterization for Optimizing Completion Decisions in the Permian Basin Using a Novel Field-Scale Workflow Including Wells with Missing Data:** A. Garcia, A. Jagadisan, Z. Heidari* (The University of Texas at Austin)

05F. Geomechanics Case Studies: Spacing, Interference, and Optimization

Co-Chairs: R. Hurt, A. Momin, and Z. Ye

- **Interpreting Inter-Well Poroelastic Pressure Transient Data: An Analytical Approach Validated with Field Case Studies:** B. Elliott¹, R. Manchanda², P. Seth², M. Sharma² (1. Devon Energy; 2. The University of Texas at Austin)
- **Mitigation of Well Interference for Parent-Child Well Development in Permian Basin:** A. Sangnimnuan, J. Li, K. Wu, S. A. Holditch (Texas A&M University)
- **Impact of Geology and Geomechanics on Stimulated Rock Volume and Productivity in a Multi-Landing Zone Development: A Case Study on the Vaca Muerta:** R. A. Wagner, H. Pourpak, S. Vidal-Gilbert (TOTAL SA)
- **Improving Proppant Placement with Slickwater Fracturing Fluids Through Pressure Analysis in Unconventional Fields:** J. I. Rueda, A. Momin, K. Mechkak, A. Sadykov, N. Mulhim (Saudi Aramco)
- **Estimation of 3-D Distribution of Pore Pressure from Surface Drilling Data—Application to Optimal Drilling and Frac Hit Prevention in the Eagle Ford:** J. Kalinec¹, M. Paryani^{*2}, A. Ouenes² (1. Equinor ASA; 2. FracGeo)
- **Case History Study of Seismic-Driven 3-D MEM Calibrated with 1-D MEMs and Petrophysics in Arkoma Basin, Oklahoma:** V. Swami¹, J. Tavares¹, V. Pandey¹, T. Nekrasova¹, D. Cook², J. Moncayo², D. P. Yale³ (1. CGG; 2. Bravo Natural Resources; 3. Yale Geomechanics Consulting)

06C. Oil/Gas/Water: Fluid-Fluid, Fluid-Rock Interactions and Chemostratigraphy I

Co-Chairs: S. Kelly and L. Wenger

- **Geochemical Perspectives on Cuttings-Based Chemostratigraphy and Mineral Modeling in the Delaware Basin, Texas and New Mexico:** H. Rowe¹, P. Mainali¹, M. Nieto¹, H. B. Rowe² (1. Premier Oilfield Group; 2. HarryRowe.com)
- **Understanding the Impact of Sampling Resolution on the Efficacy and Utility of Elemental Datasets in the Delaware Basin:** M. Wright¹, B. Driskill², N. Martinez¹, E. Mathia¹ (1. Chemostrat; 2. Shell Exploration and Production Company)
- **Source(s) of Produced Water in the Permian Delaware Basin, West Texas: A Geochemical Analysis:** L. T. Bryndzia, A. M. Hows, R. J. Day-Stirrat, A. Nikitin, O. Huvaz (Shell International Exploration and Production)
- **Is It in the Water? Elucidating Mineral Scale Precipitation Mechanisms on Unconventional Production String Components:** J. Mackey, J. Gardiner, B. Kutchko, M. Brandi, J. Fazio, A. Hakala (National Energy Technology Laboratory)
- **Fluid-Induced Formation Damage Mechanism and Treatment for Unconventional Reservoirs in the Permian Basin:** K. Henkel-Holan, D. Benoit, J. Yarus, K. Evans (Halliburton)
- **The Impact of Fracture Surface Area to Rock Volume Ratio on Spontaneous Imbibition in Tight Rocks with Varying Wettability:** W. Chaisoonontornytin¹, A. I. Mohamed¹, S. Bai¹, S. A. Afari¹, A. Recio III^{*2}, M. Pearl², M. Piri¹ (1. University of Wyoming; 2. Halliburton)
- **Models for Headspace Isotope and Compositional Analysis: Gas in Place, Permeability, and Porosity Prediction and Completions Planning:** S. Wu¹, A. Sneddon² (1. Power Energy and Environmental Research Institute; 2. Paladina Geoservices)

WEDNESDAY TECHNICAL PROGRAM

07B. Machine Learning, AI, and Big Data II

Chair: A. L. Lerza

- **Implementing an Integrated Production Surveillance and Optimization System in an Unconventional Field:** D. Molinari, S. Sankaran (Anadarko Petroleum Corporation)
- **Data-Driven Approach to Optimize Stimulation Design in Eagle Ford Formation:** F. Herrero Clar, A. Monaco* (Pluspetrol S.A.)
- **Continuous Mineralogical Characterization of the Bakken-Three Forks Formations: New Geological Insights from Hyperspectral Core Imaging:** B. A. Martini¹, J. Bellian², D. Katz³, L. Fonteneau⁴, R. Carey⁴ (¹Corescan Inc.; ²Whiting Petroleum Corporation; ³Encana Corporation; ⁴Corescan Pty Ltd)
- **Machine Learning Applied to 3-D Seismic Data from the Denver-Julesburg Basin Improves Stratigraphic Resolution in the Niobrara:** S. Stanley, C. Laudon*, P. Santogrossi (Geophysical Insights)
- **Integrating Geostatistical Modeling with Machine Learning and Decline Curve Analysis for Production Forecast in Shale Reservoirs: Case Study from Eagle Ford:** A. Bakay¹, J. Caers¹, T. Mukerji¹, Y. Dong², A. Briceño², D. Neumann² (¹Stanford University; ²Repsol US)
- **Application of Assisted History Matching Workflow to Shale Oil Well in Permian Basin Using Neural Network-MCMC Algorithm:** S. Tripoppoom, W. Yu, K. Sepehrnoori (The University of Texas at Austin)
- **Application of Artificial Intelligence for Recognition of Depositional Facies—Permian Basin:** R. S. Miller¹, S. Rhodes², D. Khosla³, F. Nino¹ (¹Core Laboratories; ²Pioneer Natural Resources; ³HRL Laboratories)

08G. Huff and Puff in the Eagle Ford Basin

Co-Chairs: A. Shannon and J. Alvarez

- **Compositional Tracking of a Huff-and-Puff Project in the Eagle Ford:** M. L. Carlsen¹, M. Majzoub Dahouk¹, C. H. Whitson¹, B. Younus¹, I. Yusra¹, E. Kerr², J. Nohavitzka², M. Thuesen², R. Ambrose² (¹PERA AS; ²EP Energy)
- **Relative Influence of Recovery Mechanisms for Huff-and-Puff Gas Injection in Unconventional Reservoirs:** T. Hoffman, D. Reichardt (Montana Tech)
- **Experimental and Numerical Investigation of the Diffusion-Based Huff-and-Puff Gas Injection into Lower Eagle Ford Shale Samples:** R. Barati¹, J.-S. Tsau¹, Q. Fu¹, S. Cudjoe¹, X. Li¹, D. Mohrbacher², A. Baldwin², B. Nicoud², K. Bradford² (¹University of Kansas; ²Chesapeake Energy)
- **Eagle Ford—Introducing the Big Bad Wolf:** S. Malo, N. Volkmer, J. McNamara, E. Amirian (RS Energy Group)
- **Huff-and-Puff Gas Injection for Enhanced Condensate Recovery in Eagle Ford: Field Pilot Tests:** R. Ganjdanesh¹, W. Yu¹, M. Fiallos Torres¹, E. C. Kerr², K. Sepehrnoori¹ (¹The University of Texas at Austin; ²EP Energy)
- **Evaluation of Eagle Ford Cyclic Gas Injection EOR: Matching Results from Pilot to Full Development:** G. Grinestaff¹, E. Ding², C. Barden¹, J. Miller¹ (¹Shale IOR, LLC; ²International Reservoir Technologies, Inc.)

10D1. Furthering the Understanding of Fracture Behavior, Flowback, and SRVs I

Co-Chairs: C. Yang and D. Riestenberg

- **Advanced Flowback in the Powder River Basin: Securing Stimulation Investments:** M. A. Campos, D. Potapenko, K. Moncada, J. Krishnamurthy (Schlumberger)
- **Maximizing the Value of Flowback Data Using Complementary Diagnostic Approaches: The Eagle Ford Black-Oil Case:** O. D. Ezulike, Y. Xu, H. Dehghanpour (University of Alberta)
- **Modeling Salinity Changes During Flowback to Constrain Fracture Property Estimates:** Z. Zhang, B. Yuan, C. R. Clarkson, J. D. Williams-Kovacs, A. Ghanizadeh (University of Calgary)

12B. Special Session: Scratching the Surface: Midstream Challenges and Logistics Solutions in the Permian

Please see page 13 for more information on this special session.

15A. License to Operate: Stakeholder Management and Social Performance II

Chair: S. M. Carpenter

- **An Integrated Data-Driven Approach to Quantify Oilfield Water Lifecycle and Economics in the Permian Basin:** A. Sharma, I. Thomasset (DrillingInfo)
- **EIA-EMP-EMS Integration for Shale Gas Development in the Pennine Basin, Yorkshire, Northern England:** B. O. Bassey (Robert Gordon University)
- **Permian Produced Water: Impact of Rising Handling Costs and Larger Water Cuts on Wolfcamp Growth:** R. Duman (Wood Mackenzie)
- **Salt Water Disposal Modeling of Dakota Sand, Williston Basin, to Drive Drilling Decisions:** S. Basu, T. Cross, S. Skvortsov (ConocoPhillips)

Exhibit Hall

02G. Advanced Formation Evaluation VII: Integration, Saturation, and Recovery

Co-Chairs: A. Webster and S. Perry

- **Confinement Facilitates Wetting Liquid Slippage in Mixed Wetted Nanoporous Shale:** W. Wang¹, D. Fan², Y. Su¹, J. Xu¹ (¹China University of Petroleum (East China); ²University College London)
- **Laboratory Investigation of CO₂ Injectivity and Adsorption Potential Within the Bakken Formation:** Š. Smith, B. Kurz, J. Sorensen, C. Beddoe, B. Mibeck, A. Azenkeng, S. Hawthorne, C. Gorecki (University of North Dakota Energy & Environmental Research Center)
- **Experimental and Molecular Insight on Hindered Transport of Hydrocarbon Mixture in Niobrara Shales:** Z. Zhu¹, X. Yin¹, E. Ozkan¹, R. Qiao², C. Fang² (¹Colorado School of Mines; ²Virginia Polytechnic Institute and State University)
- **Modeling and Analysis of Petrophysical Properties of Shales Undergoing Stress Shock and Hysteresis During Heating/Cooling and Loading/Unloading Processes:** F. Civan (University of Oklahoma)
- **A New Experimental Approach for Tight and Shale Formation Damage Evaluation, Focusing on Tight Gas Formations:** B. Li (China University of Petroleum [Beijing])
- **A Methodology Using Triple-Combo Well Logs to Quantify In-Place Hydrocarbon Volumes for Inorganic and Organic Elements in Unconventional Reservoirs, Recognizing Differing Reservoir Wetting Characteristics—An Example from the Niobrara of the Denver-Julesburg Basin, Colorado:** M. Holmes, A. M. Holmes, D. I. Holmes (Digital Formation)

06E. Oil/Gas/Water: Fluid-Fluid, Fluid-Rock Interactions and Chemostratigraphy II

Co-Chairs: M. Formolo and G. Zhang

- **Geochemical, Mineralogical, and Lithological Linkages in a Thick, Early Permian, Siliciclastic Succession, Midland Basin, West Texas, USA:** H. Hammon, T. Prather, H. Rowe, R. Krumm, G. Torrez, P. Mainali (Premier Oilfield Group)
- **A New Approach to Controlling Barium Scaling in Unconventional Systems:** A. D. Jew¹, Q. Li², D. Cercone³, G. E. Brown², J. R. Bargar¹ (¹SLAC National Accelerator Laboratory; ²Stanford University; ³National Energy Technology Laboratory)



- **Geochemical Modeling of Iron Scale Formation During Unconventional Simulation:** Q. Li^{2,1}, A. D. Jew¹, D. Cercone³, J. R. Bargar¹, G. E. Brown^{2,1}, K. Maher², (¹SLAC National Accelerator Laboratory; ²Stanford University; ³National Energy Technology Laboratory)
- **Flow of Gases in Organic Nanopores: A Molecular Dynamics Study:** A. Takbiri-Borujeni, M. Kazemi (West Virginia University)
- **CO₂-Shale Reactivity at the Matrix-Fracture Interface:** A. Goodman, S. Sanguinito, B. Kutchko, S. Natesakhawat, P. Cvetic (National Energy Technology Laboratory)
- **Case Study of Reservoir-Specific Chemistry to Enhance Well Performance in the Woodford Anadarko Basin:** G. Shelfer¹, W. Hill¹, N. Lett¹, T. Boudreaux¹, C. Griman¹, P. Sullivan¹, D. Shedd¹, J. Garcia², S. Henning², S. Urruty² (¹Flotek Industries; ²Camino Natural Resources)

- **An Integrated Workflow to Detect and Avoid Shallow Karst Drilling Hazards in the Delaware Basin:** P. Hoang, K. A. Soofi, P. R. Boyle, B. Lascaud (ConocoPhillips)

- **Subseismic Fault Identification Using the Fault Likelihood Attribute: Application to Geosteering in the D-J Basin:** R. Harris¹, K. Bracken¹, B. Miller², S. Angelovich², T. O'Toole^{2*} (¹Anadarko Petroleum Corporation; ²Halliburton)

Wednesday Afternoon

Session Rooms

Special Session: Best of SPWLA

Co-Chairs: S. Fluckiger and P. Kaufman

Please see page 14 for more information on this special session.

Panel: Data Analytics Update for Unconventionals—What's Missing?

Moderator: A. Lerza

Please see page 14 for more information on this panel.

01B. Operators' Forum: Case Studies Highlighting Completion Optimization with an International Focus

Co-Chairs: H. Sun and D. Livasy

- **Challenging the Paradigm: Optimizing High Density Completions in the Vaca Muerta Shale Formation:** A. Lerza, S. Cuervo, S. Malhotra (Chevron Corporation)

- **HPHT Horizontal Multistage Completion Operations Planning and Execution:** M. H. AlJubran (Saudi Aramco)

03D. Rock Quality and Horizontal Strategies and Challenges

Co-Chairs: P. Pedersen and A. Flotron

- **Real-Time Target Optimization: Multi-Well Case Study Utilizing While Drilling XRD, XRF, and Mass Spectrometry, Niobrara and Codell Formations, D-J Basin, Colorado:** A. Grau¹, R. Sterling¹, R. King³, G. Yemidale³ (¹WPX Energy; ²Confluence Resources LP; ³Reservoir Group)
- **Horizontal Targeting Strategies and Challenges: Examples from the Marcellus Shale, Appalachian Basin, USA:** D. R. Blood¹, G. G. Lash², T. E. Cahill¹ (¹EQT; ²SUNY Fredonia)
- **Characterizing Quartz Phases in the Meramec and Osage of the STACK Region Using X-Ray Diffraction:** H. Howe, B. Hollon, R. Schulze, M. King, N. Rasmussen (Weatherford)
- **Outcrop to Subsurface Reservoir Characterization of the Mississippi Sycamore Play in the SCOOP Area, Arbuckle Mountains, Oklahoma, USA:** B. M. Milad, R. M. Slatt (University of Oklahoma)

05B. DFNs: From Characterization to Simulation

Co-Chairs: A. N. Tutuncu and S. Zheng

- **Understand Dynamic Propagation of Hydraulic Fractures Using Time-Lapse Tiltmeter and Microseismic Monitoring Data:** D. Pei, E. Davis (Halliburton)
- **Experimental and Numerical Investigation of the Slippage of a Natural Fracture Resulting from an Approaching Hydraulic Fracture:** L. Hu¹, B. Hemami¹, A. Ghassemi¹, S. Riley², D. Kahn², D. Langton² (¹The University of Oklahoma; ²Devon Energy)
- **Laboratory Investigation of Leak-Off During Hydraulic Fracturing into Bedding Interfaces:** B. Abell¹, A. Bunger², E. Dontsov¹, R. Suarez-Rivera¹ (¹W.D. Von Gonten Laboratories; ²University of Pittsburgh)

08D. Flow Conformance and Sweep Efficiency Strategies

Co-Chairs: B. Dindoruk and D. Maity

- **Waterflood-on-a-Chip: Impacts of Fracture Connectivity and Wettability on Matrix Sweep Efficiency:** Y. Du¹, A. Mehmani¹, K. Xu², S. Kelly³, M. T. Balhoff¹, C. Torres-Verdin¹ (¹The University of Texas at Austin; ²Massachusetts Institute of Technology; ³ConocoPhillips)
- **A Pore-Scale Study of Non-Aqueous Foam for Improving Hydrocarbon Miscible Flooding in Water-Sensitive Tight Oil Formations:** C-Y. Sie, Q. P. Nguyen (The University of Texas at Austin)
- **Process-Based Microfluidics: Tools for Quantifying the Impact of Reservoir Quality on Recovery Factor:** L. Mejia¹, A. Mehmani¹, S. Kelly², M. Balhoff¹, C. Torres-Verdin¹ (¹The University of Texas at Austin; ²ConocoPhillips)
- **Experimental Investigation on the Application of Biological Enzymes for EOR in Shale Formations:** S. Salahshoor, M. Fahes (The University of Oklahoma)
- **A Rapid Evaluation Technique of Sweep Efficiency for Tight Oil Reservoirs Recovered with Gas Flooding:** L. Mu, Z. Chen, R. Li, X. Shang (China University of Petroleum [Beijing])
- **Impact of Polymer or Surfactant Flooding on Permafrost Stability:** D. Wang, C. Li (University of North Dakota)

09E. Reserves Estimation and Production Forecasting V: Performance Prediction and Future of Production Forecasting

Co-Chairs: X. Wu, B. Yuan, and D. Ilk

- **Does Depletion Matter? A Child Well Study:** D. Loughheed, H. Behmanesh, D. M. Anderson (NCS Reservoir Strategies)
- **Shale Gas Production History-Matching and Optimization Using Modified Rate Transient Analysis Method:** S. Baek, I. Y. Akkutlu (Texas A&M University)
- **A New Method for Production Forecasting: Predictive Analytics Versus Conventional Methods in the Montney:** M. Popp, A. Renaud (geoLOGIC Systems Ltd)
- **Decline Curve Analysis in Unconventional Reservoirs Using a Variable Power Law Model: A Barnett Shale Example:** U. O. Odi, S. Bacho, J. Daal (Devon Energy)
- **Applying Data Analytics and Machine Learning for Unconventional Oil Production Forecasting:** A. Tadjer, A. Hong, B. Reidar Brumer (University of Stavanger)

14C. Well Design and Drilling Advancements and Methods

Co-Chairs: Y. Feng and M. Poole

- **Unconventional Advanced High Performance Micromaterial for Enhancing Drilling Mud Cleaning Performance of Spacer Fluids in Horizontal Wells: From Laboratory Development to Field Applications:** R. Pernites, J. Brady, F. Padilla, J. Clark, C. McNeilly, W. Iqbal, J. Lacorte, E. Gonzalez, M. Embrey (BJ Services)
- **A Robust Methodology to Optimize Pipe Rocking Regime During Slide Drilling:** I. Rostagno¹, P. Ashok¹, E. van Oort¹, M. Yi¹, B. Potash², C. Mullin² (¹The University of Texas at Austin; ²Pioneer Natural Resources)

WEDNESDAY TECHNICAL PROGRAM

09C. Reserves Estimation and Production Forecasting III:

Reserves Implications

Co-Chairs: J. Ciezobka, F. Male, and K. Srinivasan

- **Assessment of the Reliability of Reserves Estimates of Public Companies in the US and Canada:** D. M. Gomez, W. J. Lee, D. A. McVay (Texas A&M University)
- **Data-Driven and Physics-Based Approach for Completion and Well Spacing in the Powder River Basin:** K. S. Min¹, K. Nunna², A. Brehm¹, J. Mailloux¹, S. Sankaran¹ (¹Anadarko Petroleum Corporation; ²Texas A&M University)
- **Production Diagnostic Type Curves for Performance Evaluation: An Extension of the Universal Type Curve Approach:** K. Joshi, V. Muralidharan, D. Patel (Occidental Petroleum Corporation)
- **Estimating Reserves and Tracking the Classification of Reserves and Resources Other Than Reserves (ROTR) in Unconventional Reservoirs:** N. Moridis¹, J. Lee¹, V. Jochen¹, W. Sim², T. Blasingame¹ (¹Texas A&M University; ²Aucerna)

10D2. Furthering the Understanding of Fracture Behavior, Flowback, and SRVs II

Co-Chairs: C. Yang and D. Riestenberg

- **Modeling Frac Hits Using Dynamic Microseismicity-Constrained Enhanced Fracture Regions:** P. M. Moradi, D. Angus (ESG Solutions)
- **Frac "Hit" or Frac "Miss": Strategic Completion and Stimulation Design Reduces Fracture Hits in DUC Development in the Permian Basin:** P. Pankaj (Schlumberger)
- **SRV Characterization and Optimum Lateral Well Spacing Study of a Two-Well Pad in the Midland Basin:** J. Park¹, C. Janova², K. McGuire², S. Simmons² (¹Texas A&M University; ²Parsley Energy)
- **Multi-Generation Section Development in the Wolfcamp Delaware Basin:** F. Alimahomed, R. Malpani (Schlumberger)

12A. Overcoming Gridlock: Unlocking the Midstream Bottleneck

Co-Chairs: B. Jeyachandra and K. Richter

- **Monetizing Growing Permian Basin Supply: A Holistic Midstream Approach to Understanding Potential Bottlenecks:** E. Kim (Wood Mackenzie)
- **Haynesville Midstream: Capacity Constraints and Differential Pressures:** S. Kainz (RS Energy Group)
- **Leak Detection in Wet Natural Gas Transportation Within Hilly Terrain Pipelines:** T. Lunger, L. Mitchell, H. Karami* (University of Oklahoma)
- **Compressor Downtime Prediction and Avoidance Using Machine Learning:** T. Nguyen, O. Akinnikawe, B. Herbranson, T. Stephenson (Devon Energy)

13A. Emerging Unconventional Plays and Novel Applications of Technology II

Co-Chairs: R. Fulks and M. Tobey

- **Making the Connection Between Conventional and Unconventional:** N. Masood¹, O. Ishteiwy¹, W. Dawson¹, M. Rylance¹, S. Al Harrasi¹, E. Junca¹, D. White¹, S. Kurniadi² (¹BP; ²Schlumberger)
- **Systematic Evaluation of a Major Unconventional Resource Potential in Kuwait:** B. Dharanidharan¹, R. Johnston¹, J. Hornbrook¹, M. Al-Bahar², M. Dawwas Al-Ajmi², V. Suresh² (¹Degolyer and MacNaughton; ²Kuwait Oil Company)
- **Integrated Approach to Assess Storage and Productivity Potential of Frontier Shale Oil Play in a Rift Basin, Lower Barmer Hill Formation, Barmer Basin, India:** S. Dutta¹, R. K. Yadav¹, J. Dolson², U. Kuila¹, B. Naidu¹, A. Mandal¹, S. Dasgupta¹, P. Mishra¹, P. Mohapatra¹ (¹Cairn Oil & Gas, Vedanta Ltd.; ²DSP Geosciences and Associates LLC)
- **Geology of the Turner Sandstone, Finn Shurley Field, Powder River Basin, Wyoming:** S. Sonnenberg (Colorado School of Mines)



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EXHIBITION

● EXHIBITION HIGHLIGHTS ●

● U-PITCH AT URTeC ●

● CORE EXHIBITS ●

● EXHIBITORS ●

● EXHIBITION FLOOR PLAN ●



URTeC EXHIBITION DELIVERS

The exhibit floor is the place to see, touch, and experience the latest upstream and midstream technology. Hundreds of companies, organizations, and institutions will showcase their latest innovations, techniques, and opportunities.

The floor will also feature 145 presentations in three concurrent sessions, a joint society bookstore, a core exhibit, and access to industry press. Finally, URTeC is bringing back the highly popular U-Pitch Pavilion which allows you to pitch your industry related concept to a room of industry experts and investors.

HIGHLIGHTS

Monday, 22 July

- Breakfast Bites with Exhibitors at 10:00a–11:00a
- Technical Presentations all-day
- Core Exhibits all-day
- Refreshment Break at 3:00p–4:00p
- Opening Reception at 5:00p–7:00p

Tuesday, 23 July

- Refreshment Breaks at 10:00a–11:00a and 3:00p–4:00p
- Technical Presentations all-day
- Core Exhibits all-day
- Networking Reception at 5:00p–6:00p

Wednesday, 24 July

- Refreshment Break at 10:00a–11:00a
- Technical Presentations all morning
- Core Exhibits all morning

EXHIBIT HOURS

Monday, 22 July

10:00a–7:00p

Tuesday, 23 July

9:00a–6:00p

Wednesday, 24 July

9:00a–1:00p

BOOK YOUR EXHIBIT SPACE

Last year, URTeC's exhibit hall sold out two months before the show. Don't wait to book your space. The hall will be teaming with end-users and decision makers looking to invest in the product or service that will make them more profitable.

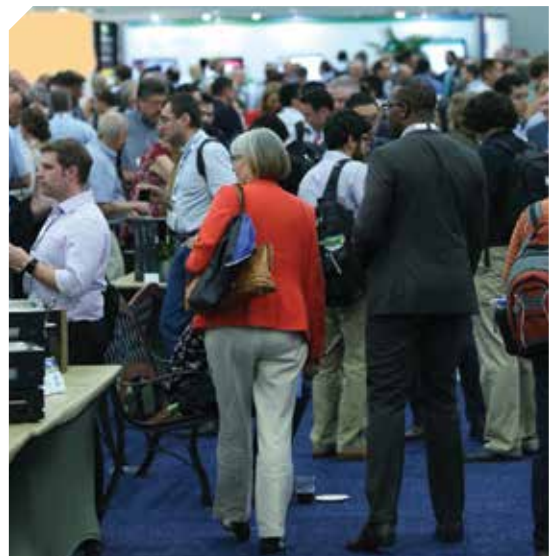
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U-PITCH AT URTeC



Need funding? Want to commercialize your product? Are you ready to GROW?
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- Dates:** 22-24 July (Monday–Wednesday)
Times: 10:30a–5:00p (Monday and Tuesday)
9:30a–12:00p (Wednesday)
Location: Colorado Convention Center – Exhibit Hall
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 - Opportunity to upload presentation to On-Demand Station where attendees can view pitches
 - Recognition on URTeC.org/2019
 - Recognition in URTeC Program Book
- Limit:** 30 presentation slots
Apply at: <https://urtec.org/2019/Technical-Program/U-Pitch>

You'll have a 30-minute block for your 15-minute presentation and time for questions and answers.

U-Pitch is perfect for your:

- Technology start-up
- Technology commercialization
- Property or project that implements new technology for new reserves or increased production
- Research consortium with new technology and techniques

What kinds of technologies attract investment?

- Smart technologies (new productivity apps, etc.)
- New imaging and interpretation software
- Safety and monitoring (smart operations)
- Data repositories
- Analytics Platforms
- Oil field chemicals
- Sensors
- Infrastructure (communications, pipeline technology, gas processing technologies)
- New materials used in drilling, etc.
- Drone technologies
- Robotics
- New services

YOUR ONLY LIMIT IS THE LIMIT OF YOUR IMAGINATION!



THE CORE EXHIBITS

Visit the Core Exhibits in the Exhibit Hall to see core samples from around North America and discover the true variability of these tight reservoirs.

Core evaluation has undergone a rebirth over the last decade thanks to unconventional plays both in North America and globally, which has necessitated a back-to-the-rocks approach to reservoir analysis. Core evaluation continues to be a fundamental component of reservoir characterization during the exploration phase in and, with recent advances, has become crucial in ongoing development as we continue to push the technological envelope to increase EUR's via Enhanced Oil Recovery mechanisms in these unconventional reservoirs.

Presentations and materials displaying the analytical methods and raw data will help provide a better understanding of the sedimentology, petrology, and reservoir characterization.

Core samples at this year's URTEC may include:

- Wolfcamp (Delaware and Midland)
- Woodford Permian
- Eagle Ford
- Avalon Shale
- Bone Spring
- Utica
- Marcellus
- Haynesville
- Austin Chalk
- Mowry/Niobrara

The Core Exhibits will be located in the Exhibit Hall and will be available during exhibition hours.



EXHIBITORS (AS OF 15 APRIL)

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ALS	432	Fracture ID, Inc.....	909	Premier Oilfield Group.....	143
American Rock Mechanics Association (ARMA)	1000	Future Geological Technologies	1321	ProCoring	114
Anadarko Petroleum Corporation	1349	Gemini Solutions Inc	910	Q Engineering	241
Apex Petroleum Engineering	945	GEO ExPro	912	Reservoir Data Systems	1138
Athena Oilfield Services	1341	GeoArray Technologies, LLC.....	1322	Reservoir Group.....	308
Baker Hughes, a GE company	922	GEDynamics.....	1117	Resolve GeoSciences Inc	458
Belloy Geologists - GazServ	1208	GeoEnergy Monitoring Systems, Inc.	1433	Resource Well Completion Technologies	256
BHL Boresight and Consulting	1142	Geolog Americas Inc	1050	Reveal Energy Services	1139
Biodentify	953	geoLOGIC systems Ltd.....	1245	Revo Testing Technologies, LLC.	757
Biota Technology	1036	GeoMark Research	121	RevoChem LLC	239
Bruker Corporation.....	643	Geomechanica Inc	855	Rock Flow Dynamics.....	1145
C&J Energy Services	617	Geophysical Society of Houston	335	Rockfield Software, LTD.....	1009
Calsep, Inc.	1040	GeoSteering Solutions, Inc.	443	Rocky Mountain Association of Geologists	952
Canamera Coring.....	152	Getech.....	142	Rogii Inc.	1133
CGG.....	317	H2 Laboratories.....	207	Rose & Associates, LLP	340
Chemostat Inc	1041	Halliburton Energy Services Inc.....	417	RPS Group Inc (Nautilus)	811
Chinook Consulting Services.....	856	Hart Energy.....	1034	RS Energy Group	449
ClampOn, Inc.	442	iCore Group, Inc.	1110	RTC Lab	1339
Coil Chem LLC	901	IHS Markit Ltd.....	523	Ruths.ai	1219
Columbine Logging.....	950	Ikon Science Ltd	1024	Rystad Energy.....	1335
Completion Science.....	1002	Impac Exploration Services	1151	Saudi Aramco	533
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CoorsTek Technical Ceramics	1314	Innovex Downhole Solutions	957	Seismos Inc.....	137
Cordax Evaluation Technologies	1211	Integrity Geological Services LLC	1142	SeisWare	1233
Core Laboratories	323	Intrepid	858	Seitel Inc	743
Corescan	1221	Ironman Specialty Fluids.....	1425	Selman & Associates, LTD.....	934
Corva AI, LLC	116	ITF Software LLC	213	SGS Canada Inc.....	849
D&L Oil Tools	817	KAPPA Engineering.....	717		
DarkVision.....	1441	King Canyon Buffalo Inc.....	217	Shale Oil Tools.....	457
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Deep Imaging	1106	Lumina Technologies	1111	Silixa LLC.....	351
Deepcast.ai	1334	Messer Group	544	Sim Tech, LLC.....	653
dGB Earth Sciences	1039	MetaRock Laboratories, Inc.	211	Soarus, LLC.....	1109
DigiM Solution LLC	120	Micotan petroleum software solutions	956	Sound QI Solutions Ltd	1113
Digital Formation/Nitec/Ridgeway Kite Software.....	433	MicroSeismic Inc.....	225	Statistics & Control, Inc.....	1420
Dissolvalloy	1250	Mid Continent Well Logging, Inc.	1324	Stratagraph, Inc	750
Diversified Well Logging, LLC	136	MJ Logs	1317	Subsurface Clarity, LLC	252
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Drillinginfo.....	822	Nanometrics Inc	337	Thermo Fisher Scientific	1153
DTCC.....	343	NanoSeis.....	905	Thru Tubing Solutions	517
DynaEnergetics US, Inc.	1157	NAPE.....	441	Tracerco	341
Dynamic Graphics Inc	935	National Energy Technology Laboratory	1313	Tricon Geophysics, Inc.	932
Dynamic Green Solutions (DGS).....	1427	National Oilwell Varco (NOV)	1239	Tubel Energy	647
EAGE - European Association of Geoscientists and Engineers.....	111	Natural Creations	850	Ubiterra Corporation	758
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ELS.....	1225	Neuralog.....	1332	Vinci Technologies.....	312
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Emerson.....	434	Newwell Tech	1118	Water Lens, LLC.....	848
Engage Mobilize	906	NodalSeismic LLC	1252	Weatherford Labs	623
Enthought.....	936	Novi Labs	1438	Well Data Labs, Inc.	1215
Enventure Global Technology	1017	NuTech Energy	744	WellDog.....	942
ESG Solutions.....	425	OAG Analytics.....	1343	WellDrive	651
Excellence Logging.....	843	Occidental Petroleum Corporation	144	Western Falcon.....	1007
Fairfield Geotechnologies	1022	Oilfield Technology	939	Wildcat Technologies, LLC	140
Field Geo Services, Inc.	1107	Osprey Informatics	1210	Wood Mackenzie	1323
Flotek Industries	1011	Optasense, Inc.....	541	World Oil/Gulf Publishing.....	742
FlowCommand	245	Paladin Geological Services	248	XWorks Technologies, LLC.....	941
FRACGEO LLC.....	115	PetroCubic Solutions	440	Zeiss Microscopy	540
		PetroDE	345	Ziebel US Inc	444
		PetroSkills	320		
		Petrosys USA Inc	1140		

EXHIBITION FLOOR PLAN

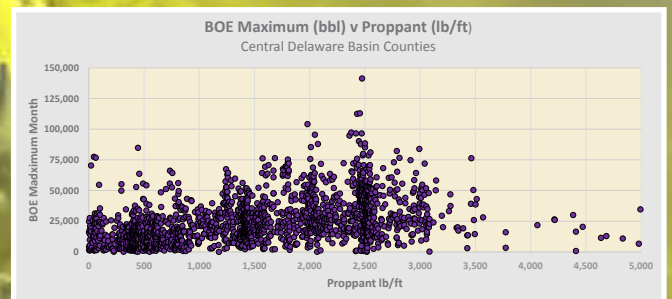
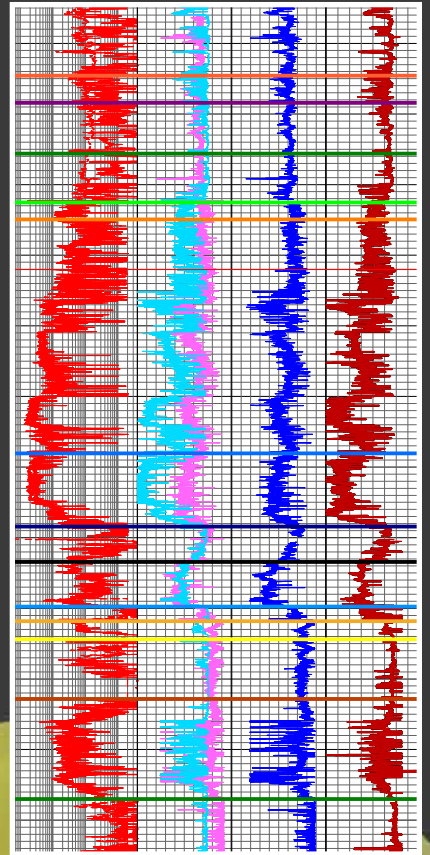


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An aerial photograph of the Denver skyline, featuring several prominent skyscrapers and a mix of urban architecture. A large, semi-transparent green hexagon is overlaid on the center of the image, serving as a background for the text and navigation links.

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REGISTRATION INFORMATION

Register Online at URTeC.org/2019

Advance online registration is recommended. This allows you to know immediately which events are available. If an event is not available, it will not appear on the screen or it will indicate "sold out."

Phone

Contact the URTeC Registration Center at +1 781 688 8000 (Monday–Friday, 8:00a–5:00p EST) to register by telephone.

On-Site

On-Site Registration will be located inside the Exhibit Hall.

Registration Hours:

Saturday, 20 July	12:00p–5:00p
Sunday, 21 July	9:00a–5:00p
Monday, 22 July	6:30a–5:30p
Tuesday, 23 July	6:30a–5:30p
Wednesday, 24 July	6:30a–1:00p

	Registration Type	On or before 7 June Midnight EST	After 18 April Midnight EST
Three-Day Conference & Exhibition	Member*	\$650	\$750
	Nonmember	\$750	\$850
	Student Member*	\$75	
	Student Nonmember	\$100	
	Includes: Access to the Opening Plenary, all panel sessions, all technical sessions, exhibition, U-Pitch Presentations, refreshment breaks, receptions as well as access to the digital conference proceedings.		
One-Day Conference & Exhibition	One-Day Member*	\$325	\$425
	One-Day Nonmember	\$425	\$525
	Registration Day: Monday, Tuesday, or Wednesday		
	Includes: Access to specific day's events including panel sessions, technical sessions, exhibition, U-Pitch Presentations, refreshment breaks, reception as well as access to the digital conference proceedings. Please plan to pick up your badge on the day for which you registered.		
One-Day Exhibition Only	One-Day Member*	\$75	
	One-Day Nonmember	\$75	
	Registration Day: Monday, Tuesday, or Wednesday		
	Includes: Access to a specific day's exhibit hall technical sessions, exhibition, U-Pitch presentations, refreshment breaks, and reception. Please plan to pick up your badge on the day for which you registered.		
Non-Conference	Member*	\$30 + cost of courses	
	Nonmember	\$30 + cost of courses	
	Includes: Access only to field trip(s) and/or short course(s) for which you register. If you do not register for the conference in addition to the field trip(s) and/or short course(s), you will not receive access to any activities or events during the conference.		
U-Pitch Presenter (Access Code Required)	Member/Nonmember	\$250	
	Registration Day(s): Monday, Tuesday, or Wednesday		
Includes: Access to the exhibit hall for the duration of the conference; a 30-minute block of time to present in the U-Pitch pavilion; and the opportunity to upload your pitch to an on-demand station in the pavilion, where pitches will be available for attendees to view at any time. See page 40 for details on how to become a U-Pitch Presenter.			

Member rates apply to members of the following societies:

* AAPG (American Association of Petroleum Geologists), AIChE (American Institute of Chemical Engineers), AIST (Association for Iron & Steel Technology), ARMA (American Rock Mechanics Association), ASCE (American Society of Civil Engineers), ASME (The American Society of Mechanical Engineers), SEG (Society of Exploration Geophysicists), SME (Society for Mining, Metallurgy & Exploration), SPE (Society of Petroleum Engineers), SPEE (Society of Petroleum Evaluation Engineers), and SPWLA (Society of Petrophysicists and Well Log Analysts).

Registration and Hotel Reservation Scam

Please note that URTeC is the target of fraudulent websites pretending to offer registration and housing services for this year's event in Denver. All legitimate URTeC communications and web pages carry the official URTeC logo and refer to our sponsoring organizations

– SPE, SEG and AAPG. **The Pulse Network (TPN)** is the only authorized registration company, and **Experient** operates the only authentic URTeC Housing Bureau. All URTeC transactions can be securely handled through the official URTeC website at www.urtec.org/2019. If you have any questions or concerns, please contact us before purchasing registration or making a hotel reservation.



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GETTING AROUND DENVER



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Airport Information

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Distance from the convention center: 25.4 miles
Drive time (depending on traffic): 38 minutes



Airport Transportation

Airport Rail

Now easier than ever to get from Denver International Airport (DEN) to downtown Denver with the opening of the new Denver airport train line. \$10.50 will provide travelers access to the A Line, to get from the airport to Denver Union Station.

The A Line opened in April 2016 and is the heart of downtown, which is the city's new transportation hub and "living room," thanks to its plush surroundings. From Union Station, travelers can access additional local and regional transportation service, such as a light rail, regional and local buses, Amtrak rail service, taxis and the free 16th Street Mall shuttle (MallRide) and free downtown MetroRide buses that provides access to most downtown hotels. The new Denver airport rail has six (6) stops between the airport and Denver Union Station. The ride takes approximately 37 minutes.



Public Transportation

Regional Transportation District (RTD)

Public transit for metropolitan Denver/Boulder. One-Day and Five-Day Passes are available for unlimited travel for bus and light rail service in the Denver metro area. Passes can be purchased individually or at a discount for large groups. Please visit the website for more information at www.rtd-denver.com.

Rideshare

Services from Uber and Lyft are available in the Mile High City. If you're a new Lyft user, enjoy up to \$20 in ride credits. Simply download the Lyft mobile app, enter the VISITDEN code under the app's "Promos" section, request a ride and you're on your way!

16th Street Mall Ride

MallRide, a free hybrid vehicle, scoots up and down the 16-block tree-lined retail core of downtown Denver, also home to hotels, restaurants, office buildings, residences and public spaces. Hop on at any intersection on 16th Street between Civic Center Station at Broadway near the Colorado State Capital and Union Station on the west end.

Taxis

Taxi cabs offer a flat rate from the airport to downtown Denver of \$55.15 (rate includes airport access fee).

- Freedom Cab: +1 303 444 4444
- Metro Taxi: +1 303 333 3333
- Union Taxi: +1 303 922 2222
- Yellow Cab: +1 303 777 7777

Driving Directions

Colorado Convention Center from Denver International Airport

Go North on Terminal Return towards Pena Boulevard. Take Pena Boulevard to I-70 West. Continue on I-70 West to I-25 South, and take Speer Boulevard South (Exit 212B). Turn left at Stout Street. From Stout Street, turn right on 14th Street and proceed to the facility entrances located on 14th Street between Stout and California Street. The entrance to our parking garage is located on northbound Speer Boulevard between Stout Street and Champa.

From Boulder or Northern Colorado

Take the US-36 East ramp towards Denver. Take I-25 South/I-76 West/US-87 South ramp towards Denver. Merge onto I-25 South/US-87 South ramp. Take I-25 South and exit on Speer Boulevard South (Exit 212B). From Speer Boulevard South, turn left at Stout Street. From Stout Street, turn right on 14th Street and proceed to the facility entrances located on 14th Street between Stout and California Street.

From Southern Colorado or the Denver Tech Center

Take I-25 North. Take the US-40/Colfax Avenue East exit (Exit 210A). Merge onto Colfax Avenue going East. Merge into the left-hand lane. Turn left at Kalamath Street. Kalamath Street becomes Stout Street as it crosses over Speer Boulevard. From Stout Street, turn right on 14th Street and proceed to the facility entrances located on 14th Street between Stout and California Street.

From West Metro Denver

Take I-70 East. Merge onto I-25 South. Take I-25 South to Speer Boulevard South (Exit 212B). Take Speer Boulevard South and turn left at Stout Street. From Stout Street, turn right on 14th Street and proceed to the facility entrances located on 14th Street between Stout and California Street.



Denver Climate

In summer, Denver enjoys low humidity, which makes for warm sunny days and cool but comfortable evenings. The average daily temperatures range from lows of 55 to highs of 85 degrees Fahrenheit in July. The mild weather is due in part to the city's altitude: 5,280 feet above sea level—or exactly a "mile high."

No-Smoking Policy

STATEWIDE Smoking Ban

In 2006, Colorado lawmakers passed the Colorado Clean Indoor Air Act to protect the health of both the public and employees by reducing their exposure to secondhand smoke. Effective 1 July 2006, restaurants, bars and other indoor establishments in Colorado must be 100 percent smoke-free inside at all times. Some tobacco bars with humidors are exempt. Smoking is also prohibited 15 feet from any main entryway.

Visa Information

The U.S. requires the citizens of many foreign countries to obtain visas to enter the United States. If you are not a U.S. citizen and are intending to attend URTeC 2019, please ensure you obtain the correct visa to enter the country. Detailed information on the U.S. Visa Policy can be found online at the U.S. Department of State Website at <https://travel.state.gov/content/travel/en.html>. It is your responsibility to apply for a passport, visa, or any other required documents and to demonstrate to consular officials that you are properly classifiable as a visitor under the United States Law. You may print your own URTeC visa letter by selecting the box online during the registration process. Letters will be sent to those that are registered and are fully paid. URTeC supplies this letter for visa purposes only. If your visa application is denied and URTeC receives a copy of the denial by email at kmccolloch@urtec.org or fax to +1 918 560 2684 before 24 July 2019, your registration fee will be refunded less a \$75 processing fee.

EXPLORE AND EXPERIENCE DENVER

Welcome to Denver!

Denver boasts the 10th largest downtown in America and one of the most exciting and walkable. Within a mile radius, downtown Denver has three major sports stadiums, the nation's second-largest performing arts center, three colleges with 30,000 students, an assortment of art and history museums, a mint that produces 10 billion coins a year, a river offering white water rafting, a \$140 million theme and water park, a \$100 million aquarium, and an exciting variety of restaurants.

Exploring the City

While in Denver for URTeC 2019, take some time to enjoy the sights. With activities for everyone, there's plenty to see and do while you're in town. Visit www.denver.org for more information. Below are some of the exciting places you can visit during your stay.

- Red Rocks Park & Amphitheater
- Denver Union Station
- Coors Brewery Tour
- 16th Street Mall
- U.S. Mint
- Colorado Railroad Museum
- Denver Zoo

Downtown

The Colorado Convention Center is conveniently located in vibrant downtown Denver. It is within walking distance of some of the city's most popular attractions. Whether you spend time leisurely shopping at the 16th Street Mall, dining at one of the many high-quality restaurants, visiting inspiring museums, or enjoying a Colorado Rockies game, there is something for everybody in downtown Denver.

Denver Museum of Science and Nature

From stunning prehistoric fossils to an exploration of outer space, The Denver Museum of Nature & Science amazes visitors with realistic visions of the past, present, and future. The Gates Planetarium is one of the most sophisticated planetariums in the country, giving visitors unparalleled insight into the workings of the cosmos, and the Phipps IMAX Theater features brilliantly filmed IMAX entertainment.

Confluence Park

Denver was founded at Confluence Park as a gold mining camp in 1858. Today, the river park is the heart of Denver's 850-mile bike trail network and is surrounded by attractions. Ride the Platte River Trolley to the Downtown Aquarium to see stingrays and sharks and The Children's Museum of Denver, with dozens of interactive "playscapes" for younger kids. Eat and drink in the nearby neighborhoods of Riverfront, LoHi, and Highlands.



STAYING IN DENVER



Please book your rooms through the URTeC Housing Bureau, Experient. This helps URTeC meet hotel room block commitments and avoid penalties that could ultimately increase conference expenses. New hotel reservations must be reserved with the Housing Bureau by **2 July**.

Hotel	Address	Single/ Double	Extra Person Charge	Walking Distance to Convention Center	In-Room Dining	Parking* (Daily)	Guest Room Internet
Aloft Denver Downtown	800 15th St.	\$229	\$10	1 block / 0.1 mile to the Convention Center	No	Self–No Valet–\$42	Free
Brown Palace	321 17th St.	\$245	\$20	0.5 miles to the Convention Center	Yes	Self–No Valet–\$49	Free
Crowne Plaza Denver Downtown	1450 Glenarm Place	\$234	\$10	0.2 miles to the Convention Center	No	Self–No Valet–\$35	Free
Embassy Suites by Hilton–Denver Downtown Convention Center**	1420 Stout St.	\$239	\$15	Across the street from the Convention Center	Yes	Self–No Valet–\$47	Free
Holiday Inn Express Denver Downtown**	401 17th St.	\$184	\$20	0.5 miles to the Convention Center	No	Self–No Valet–Daily Parking \$39	Free
The Curtis–A DoubleTree by Hilton	1405 Curtis St.	\$229	\$10	1 block / 0.1 miles to the Convention Center	Yes	Self–\$38 Valet–\$42	Free



Aloft Denver



Brown Palace



Crowne Plaza



Embassy Suites



Holiday Inn Express



The Curtis

The hotels are smoke free and include restaurants on the property, a lounge, pool (except Brown Palace and Holiday Inn Express), and fitness centers, business centers, complimentary Wi-Fi in public areas, and available guest room internet. Hotel rates do not include taxes. Information listed above is subject to change at hotel's discretion. *Parking rates are subject to change and subject to hotel specifications. **Breakfast is included.

Book Online at URTeC.org/2019

Online booking of accommodations allows you to immediately know the availability of your required nights. Additional accommodations details and policies are also found at URTeC.org/2019. To receive the URTeC conference rate, all hotel reservations must be made through the Housing Bureau, Experient.

Deposits

All reservations require a credit card guarantee. Hotel requires cancellation notice of 48 hours prior to the reservation date to avoid cancellation penalty. Failure to arrive on your confirmed arrival date will result in one night's room

and tax charged by the hotel to the credit card provided and your entire reservation will be cancelled. Hotel may also add an early departure fee should you check out prior to your scheduled departure date.

Changes/Cancellations

Reservation changes and cancellations can be made via the web-site or via email on or before **2 July**. After **2 July** any reservation changes or cancellations must be made directly with the hotel.

NOTE: The hotel will not have record of your room reservation until 3 July. If you need to make changes or cancel your reservation with the hotel, please do not call the hotel before 5 July.

Registration and Hotel Reservation Scam

Please note that URTeC is the target of fraudulent websites pretending to offer registration and housing services for this year's event in Denver. All legitimate URTeC communications and web pages carry the official URTeC logo and refer to our sponsoring organizations – SPE, SEG and AAPG. **The Pulse Network (TPN)** is the only authorized registration company, and **Experient** operates the only authentic URTeC Housing Bureau. All URTeC transactions can be securely handled through the official URTeC website at www.urtec.org/2019. If you have any questions or concerns, please contact us before purchasing registration or making a hotel reservation.

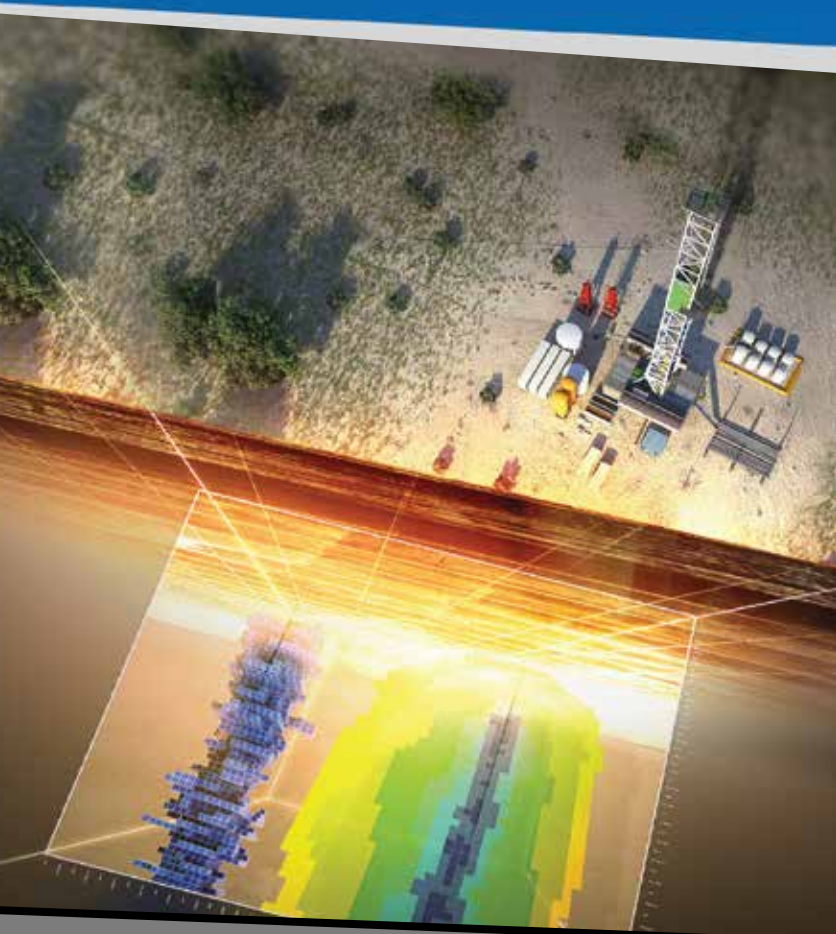


REGISTER NOW

URTeC.org/2019

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BOOTH
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