Significant value has been created in Unconventional Well Completions and Stimulations over the past decade. Much of this value has come from increasing fracture intensities by creating more and larger fractures. Understanding the interdependencies of the fracture intensities with resource development optimization is critical to determine the best economic risk balance of resource development with managed over-capitalization. As resource developments mature, managing parent-child well interactions have become more challenging. This Applied Technology Workshop has been designed to share data, experiences, and ideas from across North America Unconventional Resource Developments for Well Completions, Resource Development Optimization and Parent-Child Interaction.

Committee Members

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Bazan Consulting

CO-CHAIRPERSON
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Shell

Neha Bansal
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**Workshop Format**
Workshops maximize the exchange of ideas among attendees and presenters through brief technical presentations followed by extended Q&A periods. Focused topics attract an informed audience eager to discuss issues critical to advancing both technology and best practices.

Many of the presentations are in the form of case studies, highlighting engineering achievements and lessons learned. In order to stimulate frank discussion, no proceedings are published and members of the press are not invited to attend.

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**Tuesday, 9 April 2019**

All Technical Sessions are located in Sapphire 2&3.

**0700–0800**
**Registration Check-in and Breakfast**
Sapphire 2&3 Foyer

**0800–0810**
**Chairperson’s Welcome and Safety Moment**

**0810–0830**
**Objectives & Overview of Workshop**

**0830–1000**
**Session 1: Sub-Surface Drivers & Interdependence with Resource Development Optimization (RDO) & Parent-Child Interaction**

**Session Chairs:** Tom Blasingame, Texas A&M University
Jennifer Miskimins, Colorado School of Mines

This session will “set the stage” for the workshop, discussing economical aspects to legal considerations regarding the parent child interaction and impact on well-to-well interference and resources development.

- **Presentation 1:** TBD
  Brendan Elliott, Devon

- **Presentation 2:** Defining Parent-Child in “Shale 3.0”
  Clint Barefoot, DrillingInfo

- **Presentation 3:** Parent-Child Relationships - Implications for the Reserves Evaluator

**1000–1030**
**Coffee Break | Sapphire 2&3 Foyer**

**1030–1200**
**Session 2: Stage Design Considerations**

**Session Chairs:** Neha Bansal, Anadarko
Jed Wagner, Pioneer Natural Resources

What information is needed to effectively stimulate unconventional rock? Speakers will address these issues and much more from providing design teams information and balance in a multi-disciplinary workflow.

- **Presentation 1:** Stage Design Controls On Parent-Child Relationships Illuminated by Microseismicity: A Delaware Basin Wolfcamp Example
  Dave Cannon, Diamondback Energy

- **Presentation 2:** Multi-Disciplinary Data for Pad Well Stimulation Designs
  Bob Barree, Barree and Associates

- **Presentation 3:** Application of Diagnostics to Enable Extended Stage Lengths in the Montney
  Justin Kitchen, ARC Resources

**1200–1330**
**Lunch**
Ocean Lawn & Terrace
Session 3: Stimulation Distribution Effectiveness: High Cluster Intensity PnP Completions, Single Point Entry, Diversion, ReFrac

Session Chairs: Paul Huckabee, Shell
               Michael Lattibeaudiere, Marathon Oil

Speakers will address the distribution of fluid and proppants along a lateral including perforation friction, distribution and the use of pin-point stimulation.

- **Presentation 1:** Count vs Control Offsetting Depletion: Limited Entry Plug and Perf vs Pinpoint Completion
  Kyle Haustveit, Devon

- **Presentation 2:** Proppant Transport and Operational Observations from the Williston Basin when using HVFR, XLE, HDP and ISPC
  Paul Weddle, Liberty Resources

- **Presentation 3:** Post Stimulation Diagnostic Evaluation at Low Rates of Perf Cluster Efficiency
  Lucas Bazan, Bazan Consulting

Coffee Break | Sapphire 2&3 Foyer

Session 4: Water Volume & Proppant Volume Intensities: Interdependencies

Session Chairs: Lucas Bazan, Bazan Consulting
               Paul Huckabee, Shell

This session will present results in well spacing and results on frac-to-well interaction, prevention methods, production responses and economic considerations where excessive volumes of proppant loading have become problematic.

- **Presentation 1:** Job Design Trials Lead to Improved Infill Completions in the Eagle Ford Shale
  Mary Garza, Noble

- **Presentation 2:** Statistical Evaluation of the Influence of Proppant Mass and Fluid Volume in Several Shale Basins
  Leen Weijers, Liberty Oilfield Services

- **Presentation 3:** Multivariate Analysis to Quantify Fluid and Proppant Impact on Production from Parent and Child Wells
  Patrick Rutty, DrillingInfo

Networking Reception | The Blue Room

Wednesday, 10 April 2019

0700–0800
Continental Breakfast
Sapphire 2&3 Foyer

0800–0930
Session 5: Integrated Diagnostics
Session Chairs: Eric Holley, Halliburton
               Paul Huckabee, Shell

Current applications used to evaluate the distribution and effectiveness of domains from wellbore to far-field dimension will be the key topic of this session. How do we understand processes better? Speakers will provide examples on how to improve and understand these well-to-well/frac-to-frac behaviors.

- **Presentation 1:** Job Design and Evaluation of Parent-child Well Interactions Using Fiber Optics, BHP, Production Logging and Downhole Camera Data
  Craig Wittenhagan, Ascent Resources

- **Presentation 2:** Application of Distributed Sensing and Pressure Diagnostics to Characterize Near-Wellbore and Far-Field Stimulation Domains
  Gustavo Ugueto, Shell

- **Presentation 3:** Intervention Based DFO Used to Evaluate Parent-child Interaction Along the Well Bore
  Ahmed Attia, Ziebel

0930–1000
Coffee Break | Sapphire 2&3 Foyer

1000–1130
Session 6: Fracture/Well Interactions During Stimulation & Production
Session Chairs: Brendan Elliott, Devon
               Buddy Woodroof, ProTechnics

The session will discuss case studies on Fracture Driven Communication. Many scientific conclusions can be drawn, but we will explore these reservoir interactions and look at the positive and negative implications.

- **Presentation 1:** Frac Hits, Drainage Patterns, and Well Spacing in the Bakken: A Tale of Two Models
  Craig Cipolla, HESS

- **Presentation 2:** Efficient Tactics to Decipher Offset Pressure Data and Inform Completion/Spacing Design
  Nico Roussel, ConocoPhillips

- **Presentation 3:** Using Field Offset Well Pressure Response to Improve Completion Design
  Puneet Seth, University of Texas at Austin

1130–1300
Lunch | Ocean Lawn & Terrace

1300–1430
Session 7: Parent-Child Depletion Mitigation
Session Chairs: Neha Bansal, Anadarko
               Brendan Elliott, Devon

This session will focus on industry efforts to mitigate depletion using pressure maintenance, parent well fracs and overall development optimization. Speakers will focus on new and novel methods for mitigating parent-child depletion and best practices.

- **Presentation 1:** Re-frac, Re-pressurization, or Well Shut-in? A Bakken Field Case to Improve Parent-child Well Performance
  Lionel Ribeiro, Equinor

- **Presentation 2:** Parent Well ReFracs: Maximizing Unit Recovery in the Eagle Ford
  Scott Baker, Devon

- **Presentation 3:** Design and Analysis of Parent Well Protection Methods in Depleted Shale Reservoirs
  Junjing Zhang, ConocoPhillips

1430–1500
Coffee Break | Sapphire 2&3 Foyer
Session 8: Appalachia
Session Chairs: Lucas Bazan, Bazan Consulting
Karen Olson, Southwestern Energy Company

This session will highlight the latest in technologies and diagnostics in the Appalachian Basin. It will include several case histories and updates from operators, service providers, and academia.

- **Presentation 1:** Advancements in Appalachia
  Joe Frantz, Range

- **Presentation 2:** Plugless Completions Techniques and Evaluation in the Appalachian Basin
  Austin Blake, CNX

- **Presentation 3:** Completion Evolution using Data Analytics
  Ron Hyden, Southwestern Energy Company

1630–1800
**Networking Reception**
Ocean Lawn & Terrace

Thursday, 11 April 2019

0700–0800
**Continental Breakfast**
Sapphire 2&3 Foyer

0800–0930
Session 9: Canada
Session Chairs: Mike Dembicki, Seven Generations Energy
Robert Hawkes, Trican

This session will explore how the Montney and Duvernay plays in Canada are dealing with changing completions techniques to optimize full field development.

- **Presentation 1:** A Large Volume Parent Well Preload Experiment in the Montney
  Rob Zinselmeyer, ARC Resources

- **Presentation 2:** All in the Family: Midlife Crisis and the Advent of Designer Babies
  Tyler Schlosser, McDaniels and Associates

- **Presentation 3:** Fox Creek Duvernay Well Spacing and Completions Journey – A Bumpy Ride
  Jeff MacDonald, Shell

0930–1000
**Coffee Break**
Sapphire 2&3 Foyer

1000–1130
Session 10: Mid-Continent & Eagleford
Session Chairs: Bruce Darlington, Newfield
Kyle Haustveit, Devon

Diagnostic pilots that improve the understanding of depletion impacts as well as mitigation techniques to combat challenges in the Mid-Continent and Eagle Ford wells will be discussed.

- **Presentation 1:** Data Driven Decisions: Quantifying Risk of Parent-Child Interactions in the Eagle Ford and STACK
  Kaydee Cunningham, Devon

- **Presentation 2:** Integrated Analysis for Eagle Ford Infill Pilot
  Oscar S. Mora, ConocoPhillips

- **Presentation 3:** Validating Refrac Effectiveness with Carbon Rod Conveyed Distributed Fiber Optics in the Barnett Shale
  Jared Brady, Devon

1130–1300
**Lunch**
Ocean Lawn & Terrace

1300–1430
Session 11: Rocky Mountain Region
Session Chairs: Michael Lattibeaudiere, Marathon Oil
Paul Weddie, Liberty Resources

The Williston and DJ Basin include data-rich studies using various mechanisms for fluids and proppant to stimulate wells. Discussions will focus on pressure and mechanical diversions and the evolution to access additional reserves.

- **Presentation 1:** Well Performance and Capital Efficiency Optimization Using Multiple Diversers in the Bakken and Three Forks
  Jennifer Charbonneau, Oasis

- **Presentation 2:** Completions Optimization Using Hybrid Methods: Right Sizing Stages and Spacing in the Presence of Well Interference in the DJ Basin
  Kevin Tanner, Anadarko

- **Presentation 3:** Bakken Integrated Planning & Risk Mitigation: An Operator’s Perspective
  Bharath Rajappa, ConocoPhillips

1430–1500
**Coffee Break**
Sapphire 2&3 Foyer

1500–1630
Session 12: Permian
Session Chairs: Richard Sullivan, Anadarko
Jed Wagner, Pioneer Natural Resources

This session will discuss field case studies around the challenges of understanding and modeling SRV in the Permian Basin. We will walk through various stages of gathering, experimenting, and refining our understanding of the unconventional stimulation via field data capture and modeling applications.

- **Presentation 1:** Permian Basin Completion Progression
  Jay Brenner, WPX

- **Presentation 2:** Proppant Loading and Stage Spacing for both Unconfined and Confined Development
  Tom Cook, Noble

- **Presentation 3:** Completions Optimization Using Hybrid Workflows – Unleashing Data Analytics on Dynamic SRV Simulations
  Vikram Sen, Anadarko

1630–1700
**Closing and Workshop Wrap Up**