Applications Of New Technologies For Enhanced Well Completions In The Vaca Muerta | One Day Course

October 24, 2017 in Buenos Aires, Argentina

Hosted by AAGGP

LECTURERS: **Ali G. Garcia** — *Owen Oil Tools (Division of Core Lab)*
David W. Hume — *Integrated Reservoir Solutions (Division of Core Lab)*
Dick Leonard — *ProTechnics (Division of Core Lab)*
Jeremy Dumoit — *Seismos*
Josh Ulla — *FractureID*
Peter M. Duncan, PhD — *MicroSeismic, Inc.*

OVERVIEW

This one-day course will introduce you to various technologies and their applications for successful shale development and completions in the Vaca Muerta.

- Gain insight from 20 years of unconventional experience in North America
- Learn about technologies and how to apply them in challenging commodity price environments
- Receive knowledge about how to make marginal fields commercially viable
- Learn techniques to reduce drilling and completion costs

ABSTRACTS

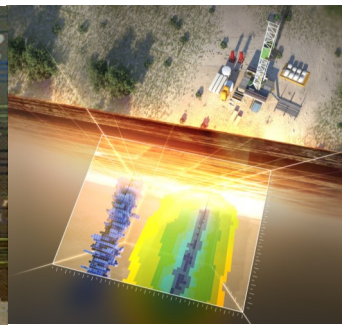
Consistent Entry Hole Diameter Charges and Methods for Efficient Perforating in Horizontal Multi-Zone Sections

By Ali G. Garcia, Owen Oil Tools (Core Lab)

Perforation design is critical to the success of hydraulic fracturing campaigns in today's unconventional reservoirs. The perforations represent a very small percentage of the actual costs of drilling and completing a well while they are the only connection between the wellbore and the formation. The thought that "a hole is just a hole", does not take into account major advancements in perforation charge design.

The efficiency of the perforation clusters can vary greatly depending on the perforating system chosen. Consistent Entry Hole charges provide uniform hole size circumferentially regardless of gun position. This consistent hole size may result in reducing the effect of tortuosity, lower breakdown pressures, lower treating pressures, better proppant placement, and increased SRV.

This presentation will focus on optimizing designs, certification testing, and case study history from US shale plays demonstrating increased fracture results and methods for efficient perforating in horizontal multi-zone sections using Delay Fuses and Oriented Perforating.



AGENDA

9:00 AM: REGISTRATION & BREAKFAST

9:45 AM: WELCOME

10:00 AM: Consistent Entry Hole Diameter Charges and Methods for Efficient Perforating in Horizontal Multi-Zone Sections

10:30 AM: Advanced Cuttings Analysis for Unconventional Wells

11:00 AM: Application of Rock Mechanics Along Lateral Wells to Improve Completions and Production

12:00 PM: LUNCH

1:30 PM: Near and Far-field Fracture Conductivity Measurements and Applications in Unconventional Reservoirs

2:30 PM: Completion Diagnostics – Providing Solutions for Today's Most Challenging Questions

3:00 PM: Holistic Completion Planning From a Geological Prospective: Using Core, Cuttings, Drillbit Geomechanics, Tracer and Microseismic Data to Improve Hydraulic Fracture Designs

3:30 PM: Recent Developments in Quantitative Microseismic Analysis

4:30: COCKTAILS & HORS D'OEUVRES

REGISTER NOW

Applications Of New Technologies For Enhanced Well Completions In The Vaca Muerta | One Day Course

Date: October 24, 2017
Time: 9:00 am — 5:00 pm
Location: Pestana Buenos Aires Hotel
Carlos Pellegrini, 887
C1009ABQ
Buenos Aires, Argentina

Email aagyqp@gmail.com to register.

Abstracts (Continued)

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Advanced Cuttings Analysis for Unconventional Wells

By David W. Hume, Integrated Reservoir Solutions (Core Lab)

While there is a wealth of information that can be gained from core and open-hole logs, the vast majority of this data is collected from vertical wells. The challenge is how to extend and calibrate this information to the geology in horizontal wells. Most operators run an MWD log but it is generally cost prohibitive to run the sophisticated logs required to evaluate the horizontal section. The one source of rock data that is common to all horizontal wells is cuttings. X-Ray diffraction and various geochemical analyses have long been used to determine the rock properties of cuttings (mineralogy and TOC for example) and more recently X-Ray Fluorescence has been used to define the elemental components of the cuttings. The concentration and ratios of many of these elements are now used as indicators for things like organic content and geomechanical properties. A new sophisticated geochemical process is also now available. This cuttings analysis uses proprietary methodology to concentrate and separate the key components (volatiles) via a cryogenic process, prior to quantification of individual components via mass spectroscopy. It measures measure minute amounts of hydrocarbons, organic acids and inorganic gases. This data can be used to identify numerous attributes of the rocks and fluids in horizontal wells. Advanced cuttings analysis can bridge the gap between the vertical and the horizontal.

Application of Rock Mechanics Along Lateral Wells to Improve Completions and Production

By Josh Ulla, Fracture ID

Fracture ID will discuss the study of accelerations recorded at the bit to determine rock properties such as Poisson's ratio, Young's modulus, fracturing and bedding. As the PDC bit cuts through the rock, the cutter heads interact with the formation in a manner comparable to an earthquake and Fracture ID will discuss this relationship. Once this data is acquired on a single well the lateral is better understood and these measurements can be exploited to increase perf efficiency during completions and thus improve production. By collecting these measurements on multiple wells the reservoir team can build improved three dimensional models to pursue sweet spots, ideal landing zones and efficient well spacing. These and other applications will be discussed.

Near and Far-field Fracture Conductivity Measurements and Applications in Unconventional Reservoirs

By Jeremy, Dumoit, Seismos

Historically, there have been very few direct measurements of the fracture network created by hydraulic stimulation. Because of this, many assumptions are made when creating and optimizing fracture, reservoir, and production models.

Changes in acoustic reflectivity, and post-shut-in pressure decay are observed, and inverted to assess near-wellbore and far-field fracture conductivities. The ability to measure relative stage to stage effective conductivity during the fracturing treatment, and effective total conductivity over the life of the well allows better model constraint, and improved production, and reservoir drainage predictions.

Furthermore, near-wellbore conductivity is related to near-wellbore complexity, proppant efficiency, and ultimately, sustained future connectivity of the wellbore to the created fracture network. These direct fracture measurements also provide a context in which to better interpret other data; and when combined with data such as microseismic, or DAS, they offer a very robust assessment of the created fracture system.

Completion Diagnostics – Providing Solutions for Today's Most Challenging Questions

By Dick Leonard, ProTechnics (Core Lab)

In horizontal shale completions, one of the primary goals is to maximize contact with the most reservoir rock and effectively drain the complex fracture network that has been created during the stimulation process. Many operators continue to push the envelope on lateral length, stimulation size, and number of fracture stages. Critical items like: optimum well-spacing, target evaluation, stimulation coverage, cluster spacing, lateral cleanup, stage productivity, and offset well communication are continuously being re-evaluated.

Completion diagnostics such as proppant and fluid tracers can be integrated with production, stimulation and geologic data along with other technologies to provide useful information as

Abstracts (Continued)

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to the effectiveness of the completion design. Proppant tracers are utilized to evaluate near-wellbore fracture initiation and identify under-stimulated/un-stimulated perforation clusters. Additionally, these tracers quantify proppant communication between multiple stimulated wellbores. Fluid tracers (both water and hydrocarbon) are currently being used to quantify hydrocarbon productivity and fracture fluid recovery along the lateral over time while also identifying the magnitude and duration of communication with offset wells. This information can be extremely valuable in determining drainage areas and optimizing well spacing.

This presentation will show several case histories where these diagnostic technologies were instrumental in addressing several completion design questions and how the information was utilized in the optimization process. The examples will detail key completion parameters and how they changed over time, based on various diagnostic results. Refracturing and diversion effectiveness will also be discussed.

Holistic Completion Planning From a Geological Prospective: Using Core, Cuttings, Drillbit Geomechanics, Tracer and Microseismic Data to Improve Hydraulic Fracture Designs

By David W. Hume, Integrated Reservoir Solutions (Core Lab)

A case history will be presented that shows how geological and well tracer data from vertical wells can be used to accurately model completions and improve hydraulic fracture designs in horizontal wells. Then taking it the next step a hypothetical case history on how advanced cuttings analysis, drillbit geomechanics, and post frac analysis of well tracers and micro-seismic data can further refine the designs to optimize completion efficiencies and minimize costs.

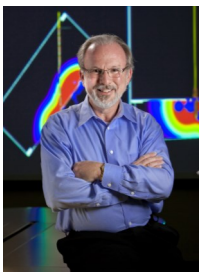
Recent Developments in Quantitative Microseismic Analysis

By Peter M. Duncan, PhD, MicroSeismic, Inc.

Microseismic data, that is the location of the microseismic events generated as the stimulation proceeds, have been used by the completion engineers to “watch” what is happening at the reservoir and confirm that the completion is going off as planned. Various methods of mapping the extent of the microseismic cloud have been used to estimate the volume of stimulated rock (SRV) as a predictor of how the well will perform. Unfortunately SRV or the propped fraction of it alone are not very good predictors of production since the amount of permeability enhancement within the SRV and the way it is distributed are key to effective drainage of the hydrocarbons present.

Recent developments in microseismic data analysis provide an insitu, real time estimate of the permeability enhancement resulting

About The Course Lecturers



PETER M. DUNCAN, PhD

President & CEO, MicroSeismic, Inc.

Peter M. Duncan is President & CEO of MicroSeismic, Inc. a Houston-based oil field service company specializing in hydraulic fracture stimulation surveillance and evaluation. He holds a Ph.D. in Geophysics from the University of Toronto. His early career as an exploration geophysicist was with Shell Canada and then Digicon Geophysical, first in Calgary then in Houston.

In 1992 he was one of 3 founders of 3DX Technologies Inc., a publicly traded independent oil and gas exploration company. Duncan was 2003-04 President of the Society of Exploration Geophysicists (SEG). Duncan was the Fall 2008 SEG/AAPG Distinguished Lecturer speaking on the subject of Passive Seismic at 45 venues around the world. He is an Honorary Member of SEG, the Canadian Society of Exploration Geophysicists (CSEG), the Geophysical Society of Houston (GSH) and the European Association of Geoscientists and Engineers (EAGE). He received the Enterprise Champion Award from the Houston Business Journal in 2010, the World Oil Innovative Thinker Award in 2011, and was the 2013 EY National Energy Entrepreneur of the Year. In 2014 he received the Virgil Kauffman Gold Medal from SEG.

Course Lecturers (Continued)

JOSH ULLA

Vice President of Business Development, FractureID

Josh has a proven track record of applying innovative and outside-the-box solutions to geoscience problems. Originally from Canada, Josh spent his last 6 years before joining Fracture ID working with ExxonMobil in Houston, Texas in the Geophysical Operations and Formation Evaluations Groups. At ExxonMobil, Josh served as the Global Borehole Seismic Expert, and was relied upon to model, design, acquire, process, and interpret seismic and petrophysical data. Prior to this, he completed his masters in potential field magnetic interpretation, bridging his Mathematics degree nicely into geophysical data analytics. Josh has both research & development, as well as hands on field experience, which make him a strong asset to Fracture ID's development. He is tasked with bringing Fracture ID to market, listening to operators' concerns, and continually improving Fracture ID's actionable results.

DAVID W. HUME

President, Integrated Reservoir Solutions (Division of Core Lab)

David Hume is a Professional Geologist with 34 years of experience in the petroleum industry. For the last 27 years he has been a reservoir characterization specialist. Originally based in Calgary, Alberta, Canada he was a founding member and Vice-President of Rakhit Petroleum Consulting Ltd. a private firm that specialized in petroleum hydrogeology and reservoir characterization. In 2005 Rakhit Petroleum merged with Canadian Discovery Ltd. and became a fully integrated geoscience consulting firm with over 70 employees. During his 25 year tenure at Canadian Discovery he conducted and managed projects in North America, South America, The North Sea, The Middle East, and Asia. In the last 10 years he focused on unconventional reservoirs and completed 12 major studies of mudstones, tight sandstones and tight carbonate reservoirs in North America. In 2015 David left Canadian Discovery to become the President of the Integrated Reservoir Solutions Division of Core Lab in Houston Texas. In his new role he oversees a diverse and talented team of senior professionals that are the industry leaders in the characterization of unconventional reservoirs. Core Lab, and Integrated Reservoir Solutions, has been instrumental in the development of new techniques and analytical methods to explore exploit and produce unconventional resources.

DICK LEONARD

Director of Global Technology Team at ProTechnics (Division of Core Lab)

Dick joined ProTechnics after working for 19 years with Union Pacific Resources in several engineering & supervisor positions. At UPR, the majority of his engineering experience dealt with the stimulation of tight sands in East & South Texas & horizontal development in North Louisiana. While he was engineering supervisor for East Texas, his group pioneered the water-frac technology that is currently being utilized in many unconventional plays throughout the country. During the last 17 years, most of Dick's focus has been on the diagnostic analysis of these unconventional plays. Throughout his 38 years in the petroleum industry, Mr. Leonard has co-authored multiple SPE papers on hydraulic fracturing and diagnostic analysis. Completion optimization, diversion analysis and refracs have been some of the specific topics covered in his most recent work. Dick graduated from The University of Texas in 1979 with a BS degree in Petroleum Engineering.

ALI G. GARCIA

Business Development Manager Latin America at Owen Oil Tools

Professional with over 37 yrs. experience, in the oil industry. Holds a Bachelor's degree in Electrical Engineering from the University of Wisconsin and Master's Degree in Marketing from URBE in Venezuela. Started his career with Halliburton occupying wireline, logging and sales duties. During the last 16 yrs. to current, he has worked for Owen Oil Tools, worldwide leader in the manufacturing of perforating systems, developing technical, marketing and management positions in North and South America.

JEREMY DUMOIT

Director of Geophysics, Seismos

Jeremy Dumoit is the Director of Geophysics at Seismos, Inc. Seismos is an Austin-based company which delivers direct measurements of fracture properties and wellbore condition before, during and after stimulation, and during production.

After graduating from Rice University in 2006 (MS – Physics), Jeremy joined Pinnacle Technologies (now HAL), becoming part of the early days of commercial microseismic services. After Pinnacle, Jeremy joined Magnitude Microseismic, LLC (a BHGE company); previously VS Fusion; at which he served in several capacities, including Senior Geophysicist, Head of Software Development, Head of R&D, and most-recently COO. Just prior to joining Seismos, Jeremy served as Principle Scientist for Baker Hughes – GE, and was involved in enterprise research/technology strategy as well as many high-profile research projects ranging from Quantum Computing to Reservoir Modeling.

Registration Information

Send an email to aagygp@gmail.com to register.

COURSE COST:

The first 5 students to register are FREE	AAGGP Members ARS $2,500/Person Two Thousand Five Hundred Pesos	Non AAGGP Members ARS $3,000/Person Three Thousand Pesos

FORMS OF PAYMENT:

1. Transfer directly to the AAGGP account. Visit www.aaggp.org.ar and in the Members tab you will find wire transfer details.
2. Cash payment, along with this form, will be accepted at the registration area at the event.

1-Day Course | OCTOBER 24, 2017

COMPLETIONS IN THE VACA MUERTA

Location: Pestana Buenos Aires Hotel
Carlos Pellegrini, 887
C1009ABQ
Buenos Aires, Argentina

FIRST NAME	LAST NAME
TITLE	COMPANY
EMAIL	