, SPE

Greetings! I hope you're excited for this month's events. We have a couple changes to our regular programming.

This months General Meeting will be replaced by the Colorado School of Mines - Denver Section Joint Session. The CSM Chapter has gathered a panel of experts, "The Golden Legends", to discuss their experiences and answer your questions. See details about the event below.

Additionally, instead of regularly scheduled study groups, this month we are pleased to invite you to the SPE Denver Student Research Presentation Series.

For these Series, students from the Colorado School of Mines had the opportunity to submit abstracts of their current research. The abstracts were scored by our SPE Denver Section Board, and the top four students have been asked to present.

During the presentations, a panel of judges will be scoring the student presenters, and the “Best in Show” will be announced at the April General Meeting.

Please see the schedule below and RSVP to the appropriate organizer if you would like to attend any of the presentations in the series.

If you would like to be considered to sit on the Judge’s panel, please send us an email.

Cheers,

Marija Mircevska

Newsletter Editor

March 7, 2016

Colorado School of Mines - Denver SPE Joint Session

The Golden Legends

Please join us at Colorado School of Mines for dinner and a panel discussion featuring the industry experts that have seen it all. Listen to their stories of success in the volatile oil and gas industry, and ask them the tough questions.

Friedhoff Hall, Green Center, Colorado School of Mines
March 23, 2016

Happy Hour: 5:30 PM
Panel Discussion: 6:30 PM

In this Issue...

Thanks to this Month's Newsletter Sponsor

*Please register by **March 17th**. Walk-ins will not be permitted.*

Register Now

Tickets:

Members	$35
Non-Members	$40

** Two drink tickets are included in the cost of admission.*

Dr. Ramona M. Graves
Moderator

- Professor and Dean of CERSE
- Reservoir Charecterizaition
- Dierector of the Laser/Rock Interaction
- Co-Director of CEMMC

Dr. Hossein Kazemi
Research and Development

- Laboratory Studies
- Technical Pioneer
- International Consultant
- Marathon Oil Company

Dr. John Seidle
Unconventionals

- Shales, Coalbed Methane
- Tech. Monograph Author
- International Consultant
- Amoco Prod. Company

Mr. Harry Surkalo
EOR Field Implementation

- Business start-up
- Technical Pioneer
- International Consultant
- Marathon Oil Company

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Dr. Craig Van Kirk
Academia

- Engineer Development
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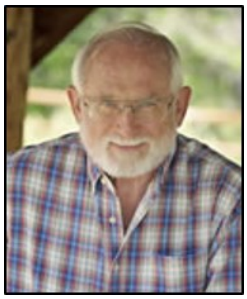
- Shell Oil Company



Dr. John Wright
Petroleum Economics

- Business Start-up
- Property Evaluation
- Technical Textbook Author
- International Consultant

HSSE STUDY GROUP | STUDENT RESEARCH PRESENTATION SERIES

Inert Gases in the Rocky Mountains: Implications for Risk, Opportunity, and New Understanding in Natural Gas Reservoirs

Bryan McDowell

March 10, 2016, 11:30 AM - 1:00 PM

Halliburton, 1125 17th Street, 19th Floor Training Room

RSVP: Clory Martin

Abstract: Inert gases, such as carbon dioxide, nitrogen, and helium, are a common occurrence within natural gas reservoirs in the Uinta and Piceance basins. These gases can be a nuisance or opportunity depending on field location, zone of interest, and relative concentration. Additionally, their presence or absence may shed light on gas migration within a basin.

The U.S. Federal Government conducted annual helium surveys within the United States from 1917 to 2007. These reports include a wealth of information from natural gas wells, including hydrocarbon compositions, inert gas concentrations, heating values, and specific gravities. This dataset is publically-available, yet largely ignored.

The Piceance and Uinta basins are large natural gas provinces which constitute three percent of domestic gas production. These reservoirs produce a wide range of inert gas concentrations (0 to 99%) from a variety of plays. Detailed analysis shows distinct differences between discrete stratigraphic intervals and geographic areas. Nitrogen and helium are correlated by multiple linear trends, suggesting nitrogen is the carrier gas for helium and multiple resource rocks and/or migration pathways are present. Vertical fractionation can be seen by differences

between highly-charged Paleozoic rocks versus inert-free Tertiary reservoirs. In Mancos B fields, the presence of helium indicates commingling between distinct petroleum systems; signifying a more significant structural control (i.e., faulting) than previously recognized.

Integrating inert gas relationships and regional geology delineate areas of low and high concentrations, important parameters when exploring for new prospects or planning production facilities. Additionally, the recent rise in helium prices may create new opportunities where methane-rich wells are uneconomic. This study proposes inert gas relationships as a potential tool for natural gas exploration and risk analysis within the Colorado Plateau and other gas-rich provinces.

COMPLETIONS STUDY GROUP | STUDENT RESEARCH PRESENTATION SERIES

Discussion of Screenout Diagnostics for Hydraulic Fracturing from Pressure Dependent Leakoff and High Process Zone Stress Aspects

Xiaopeng Li

March 17, 2016, 11:30 AM - 1:00 PM

Halliburton, 1125 17th Street, 19th Floor Training Room

RSVP: Dale Hopwood

Abstract: Unconventional resources, such as tight gas shale reservoirs, are labeled with low permeability, and thus have low economic flow capacity. Hydraulic fracturing has been the key technique to stimulate the production of these resources by creating more surface contact areas to the reservoir matrix. Sometimes, however, in the actual hydraulic fracturing treatment, the needed bottom-hole treating pressure can exceed maximum surface pumping pressure, which results in screenout. The fracture stops growing and the treatment can fail when screenout happens. A general diagnostic method to predict screenout is crucial to the success of hydraulic fracturing treatment.

Many factors can result in screenout, such as number of open perforations, near wellbore friction, friction in the fracture, plugging in fracture tips, etc. Two common types of screenouts are related to pressure dependent leakoff (PDL) effect and high process zone stress (PZS) effect. However, diagnostics of specific type of screenout present difficulties as useful information available before the actual fracturing treatment is limited especially in the new field. Moreover, the causes can be reservoir-related or engineering-related, which make the screenout hard to predict during treatment design. In order to identify those potential causes which may eventually lead to screenout, an approach coupling Geomechanics and Mini-frac test analysis techniques is introduced and discussed. Based on different screenout mechanisms, several diagnostic techniques are presented and corresponding treatments to deal with screenout are proposed.

RESERVOIR STUDY GROUP | STUDENT RESEARCH PRESENTATION SERIES

A Novel Approach to Production Data Analysis in Unconventional Wells Based on Anomalous Diffusion

Ralf Holy

March 24, 2016, 11:30 AM - 1:00 PM

Liberty Oilfield Services, 950 17th Street, Suite 2000

RSVP: Ethan Ngo

Abstract: This paper presents a new approach for production data analysis in unconventional wells, which, unlike the existing empirical techniques, is theoretically rigorous and practically convenient. The approach is based on an anomalous diffusion model for the performance of wells in fractured nanoporous media, such as that in unconventional oil and gas reservoirs. Based on actual well production data displaying straight-line behavior on a log-log plot of rate vs. time, it is hypothesized that the slope of the line might be a direct indicator of the sub-or super-diffusive state of the flow. The resulting analysis approach is compared to Duong's decline model and provides a theoretical foundation for the interpretation of the straight lines observed on log-log plots of production data.

The current diffusion-based approaches mostly use the dual-porosity idealization of naturally fractured reservoirs in which average properties are used to describe flow in the matrix and the fracture network. The equation describing the flow in both media is Darcy's law which assumes a continuum and that the particle displacement follows Brownian motion with a Gaussian (normal) distribution. While suited for conventional fractured reservoirs in which flow in both media can be modeled at the same scale, its validity for tight unconventional reservoirs including multi-scale and discontinuous fractures is questionable.

Anomalous diffusion describing non-Gaussian particle displacement in highly heterogeneous media and the use of fractional calculus, provide an alternative to model fluid flow at multiple scales. To do so, a modified flux law incorporating the non-local and hereditary nature of flow is coupled with the classic mass conservation equation to derive a fractional diffusion equation in space and time.

The proposed model is applied to field data and the interpretation of the results is presented. Forecasts for actual wells are then compared with Duong's model and conclusions drawn thereof.

DRILLING STUDY GROUP | STUDENT RESEARCH PRESENTATION SERIES

The Effect of Anisotropy Ration & Formation Damage on Horizontal Well Productivity: A Case for Longer Laterals

Ryan Paldanius

March 30, 2016, 11:30 AM - 1:00 PM

Schlumberger, 1675 Broadway, 7th Floor Training Room

RSVP: Matt Hudson

Abstract: There has been an increase in interest among operators to drill longer horizontal laterals, particularly in the shale unconventional plays in the United States. Motivation is frequently driven by project economics. Companies that accumulated large tracts of acreage during the shale boom are now interested in drilling longer laterals in order to hold more acreage by production using fewer wells. Drilling a single, longer lateral rather than two shorter ones leads to cost savings while increasing booked reserves. This assumes regulatory approval in the jurisdiction of the asset in addition to the local geology being suitable for the designed horizontal length.

This paper is a literature review of the previous work conducted on the attributes of horizontal wells including lateral length, formation damage, and permeability anisotropy ratio. It also includes an analysis of the models developed for evaluating horizontal well productivity. By reviewing the complex parameters that influence the productivity of horizontal wells, the science appears to support the economic case for drilling longer laterals (to an optimization point). Ultimately, every horizontal well will be distinct; however, the previous work conducted on this subject shows that the longer the lateral, the less impact formation damage and permeability anisotropy ratio have on the overall productivity of the well.

CONTINUING EDUCATION

Discovery and Recovery Thinking in Shales

Creties Jenkins, P.E., P.G., Partner at Rose and Associates

April 19-20, 2016, 8:00 AM - 5:00 PM
Registration Deadline is Friday, April 1, 2016

Brown Palace Hotel and Spa, 321 17th St, Denver

Register Now

Registration Fee
$1,400 for members
$1,800 for non-members
Registration fee is fully refundable until April 1, 2016

1.6 CEUs (Contiinuing Education Units) will be awarded by SPE-Americas Office for this 3-day course

For more details, contact Darien O'Brien, P.E.

Course Description: This course begins by summarizing the most important geoscience and engineering aspects of shales and illustrating these with case study posters that will be

evaluated by teams. This is followed by a series of lectures and interactive exercises focused on quantifying the range of possible outcomes for your project and making good decisions about whether to continue or exit at each stage gate.

Course Contents: Due to the inherent risks in shale plays, it is critical for practitioners to be able to quantify uncertainty, and estimate the range of risk involve. This course provides insights and tools for appraising and developing shale gas and shale oil opportunities.

- Identify those geoscience and engineering aspects most critical for success
- Learn how to quantify the range of potential project outcomes
- Be able to apply good decision behavior to the stage gate process

About the Instructor: Creties Jenkins, P.E., P.G. is a Partner with Rose and Associates, specializing in the characterization of unconventional reservoirs. Over the past decade he has conducted integrated studies, project reviews, and resource evaluations for 50+ companies and has taught 100+ industry courses and workshops. He has served as a technical editor, Distinguished Lecturer, and distinguished author for SPE and is a past president of the Energy Minerals Division of AAPG. Jenkins received a MS in Geology and a BS in Geological Engineering from the South Dakota School of Mines. He is a registered professional engineer and a registered professional geologist in Texas.

CSM SPE Clay Shoot Tournament

Annual Fundraising Clay Shoot

April 22, 2016, 12:00 PM (Noon)

Kiowa Creek Sporting Club,
46700 E County Road 30, Bennett, CO

A BBQ lunch will be provided at the beginning of the event, and is included in the initial entry price. Prizes will be handed out after the clay shoot to the team with the highest overall score, and to the highest scoring individuals.

Industry members wishing to sign up a team have two options: registration as a 4-person team, or registration as 3-person industry team with a CSM student as a 4th team member. Industry members may also register individually.

CSM students may register individually, but also have the opportunity to be sponsored by an industry team.
Registration Options:
$600 : 4-Person Industry Team
$400 : 3-Person Industry Team + CSM Student
$150 : Individual Industry Member
$50 : CSM Student

Please register your team, and sigh up under the "SPE Clay Shoot Registration" link.

Contact us if you have any questions.

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