

Executive Summary

First, I would like to take this opportunity to recognize and thank outgoing SPE Associate Editors **Elizabeth Spiteri** and **KC Yeung** for their contributions while serving on the *SPE Reservoir Evaluation & Engineering* editorial board. I would also like to thank all associate editors and technical reviewers for their support in providing timely and technically sound recommendations in 2019. The numbers of citations and publications for *SPE Reservoir Evaluation & Engineering* continued an upward trend in 2019 and are up appreciably from 2018. The number of citations increased by ~13% to 1,288, and the number of publications increased by ~51% to 106.

Over the last year, the SPE Executive Editorial Review Board has also made significant progress in reducing the time of the review process. The board established a goal in 2019 of 30 days for the time to first decision along with new editorial guidelines for the review process. Initially, this goal seemed to be a stretch, given that the average time to first decision in 2018 was 66 days for *SPE Reservoir Evaluation & Engineering*. However, the editors and SPE editorial staff worked diligently toward this goal in 2019, and as a result, the journal has achieved an average time to first decision of 31 days over the last 3 months. This is truly a remarkable accomplishment that couldn't have been achieved without the commitment and dedication of our associate editors, technical reviewers, and SPE editorial staff. Achieving this milestone is especially important for authors, who have numerous options to choose from for publication, and helps to ensure timely publication of innovative technologies in *SPE Reservoir Evaluation & Engineering*. Thanks to all involved for making this goal a reality.

This issue of the journal features 25 papers that represent an excellent cross-section of the latest advancements in trending technologies within the reservoir evaluation-engineering community. The selected papers for this issue are related to uncertainty/risk assessment, unconventional resource development, petrophysics and formation evaluation, enhanced oil recovery, reservoir management, and gas-hydrate development. Below are succinct descriptions of the papers presented in this issue.

Uncertainty/Risk Assessment

- **Reservoir Geostatistical Estimates of Imprecise Information Using Fuzzy-Kriging Approach** proposes a geostatistical approach for estimating rock properties that captures the uncertainties of input data as well as the variogram model by combining Kriging with fuzzy-logic theory.
- **Systematic Approach To Reduce Uncertainties When Quantitatively Assimilating 4D Seismic and Well Data** presents a practical methodology for quantitatively integrating well and 4D-seismic data to systematically reduce rock property uncertainties in multiobjective assisted history matching.
- **Decision Making in the Presence of Geological Uncertainty With the Mean-Variance Criterion and Stochastic Dominance Rules** introduces a decision-making model that considers geological uncertainty in the selection of projects by combining the mean-variance criterion and stochastic dominance rules to guide the selection process.
- **Improved Framework for Measuring the Magnitude and Impact of Biases on Project Evaluation** presents a generalized framework for quantifying the cost of biased estimates in project evaluations and demonstrates how to measure over/underconfidence and directional bias from probabilistic assessments of project performance that can be used to adjust new assessments.

Unconventional Reservoir Development & Management

- **Investigation of Shale-Gas-Production Behavior: Evaluation of the Effects of Multiple Physics on the Matrix** highlights the significance of natural-fracture spacing and effective stress on shale-gas reservoir performance through a comprehensive investigation of matrix physics that includes the effects of effective stress, slip flow/pore diffusion, adsorption/desorption, and surface diffusion, as well as the dynamic properties of fractures.
- **Shut-In Effect in Removing Water Blockage in Shale-Oil Reservoirs With Stress-Dependent Permeability Considered** proposes a more profitable strategy, based on an improved modeling workflow, to reduce water blockage by flowing back wells immediately after fracturing as compared to the common practice of shutting in wells.
- **An Integrated Approach To Optimize Bottomhole-Pressure-Drawdown Management for a Hydraulically Fractured Well Using a Transient Inflow Performance Relationship** presents an efficient approach to optimize drawdown in hydraulically fractured wells, without the complexity of geomechanical/reservoir

modeling, that uses a novel permeability-decay coefficient to account for the pressure sensitivity of fracture conductivity.

- **Pressure-Transient Responses of Naturally Fractured Reservoirs Modeled Using the Multistencils Fast-Marching Method** presents an extensive numerical study on the signature and recognition of fracture characteristics in naturally fractured reservoirs from pressure-transient responses of vertical wells that are computed from a multistencils fast-marching-based methodology.
- **Haynesville Shale: Predicting Long-Term Production and Residual Analysis To Identify Well Interference and Fracture Hits** presents correlations, based on 2,755 horizontal wells in the Haynesville, for predicting long-term production and identifying well interference, fracture hits, and other factors from early production data.
- **A New Technique for Quantifying Pressure Interference in Fractured Horizontal Shale Wells** introduces a new technique, based on the diffusion exponent from the power-law model, to quantify well connectivity in multistaged-hydraulic-fractured wells with complex fracture networks and illustrates its use to better understand completion size, well spacing, and well performance in the Wolfcamp Shale.

Petrophysics

- **Theoretical Study in Estimating Mineral Compositions From Spectral Measurements With a Bayesian Approach** proposes a systematic Bayesian method for inferring the mineral composition of rock samples from transmission Fourier-transform infrared spectroscopy measurements that includes a novel feature for quantifying the uncertainty in mineral estimation.
- **A Methodology for Characterizing the Multiscale Pores and Fractures in Anthracite and Semi-Anthracite Coals and Its Application in Analysis of the Storage and Permeable Capacity of Coalbed Methane** illustrates the significance of multiscale pores and fractures on the storage capacity and permeability of coalbed methane reservoirs by applying a characterization methodology that combines focused-ion-beam scanning electron microscope, X-ray micro-computed tomography, and 3D visualization technology.
- **An Integrated Method To Evaluate Formation Damage Resulting from Water and Alkali Sensitivity in Dongping Bedrock Reservoir** proposes a new method that integrates pressure-transmission tests with a fixed-point scanning electron microscope and nuclear magnetic resonance to investigate formation damage due to water and alkali sensitive clays.

Formation Evaluation

- **Identifying Formation Mineralogy Composition in Acid Fracturing From Distributed Temperature Measurements** presents a fully integrated temperature model that simulates the acid reaction and heat transfer of an acid fracture using downhole temperature measurements to identify mineralogy in multilayer fractured formations.
- **Analysis of Warm-Back Data After Cold-Fluid Injection Into Multilayer Reservoirs** presents an analytical model to determine the temporal and spatial temperature variations from downhole temperature measurements during a warm-back period following cold-fluid injection for obtaining the rate distribution over multilayer injection zones.
- **Simulation Interpretation of Capillary Pressure and Relative Permeability From Laboratory Waterflooding Experiments in Preferentially Oil-Wet Porous Media** demonstrates how relative permeability and capillary pressure in oil-wet porous media can be accurately derived from steady-state measurements of pressure drop and oil production data in multirate water-injection tests.

Gas Injection Enhanced Oil Recovery

- **Eagle Ford Huff 'n' Puff Gas-Injection Pilot: Comparison of Reservoir-Simulation, Material Balance, and Real Performance of the Pilot Well** illustrates the potential for dry-gas huff 'n' puff to improve oil recovery in the Eagle Ford Shale by comparing the performance of a gas injection pilot with reservoir simulation and tank material-balance.
- **Optimizing CO₂- and Field-Gas-Injection EOR in Unconventional Reservoirs Using the Fast-Marching Method** presents a rapid computational approach for optimizing gas-injection processes in unconventional

reservoirs that is based on the fast-marching method to enable the compositional simulation of high-resolution reservoir models with population-based optimization techniques much more efficiently.

Thermal Enhanced Oil Recovery

- **Catalytic-Effect Comparison Between Nickel and Iron Oxide Nanoparticles During Aquathermolysis-Aided Cyclic Steam Stimulation** demonstrates both nickel and iron oxide nanoparticles can act as a catalyst for aquathermolysis reactions in cyclic steam stimulation processes and that nickel is the more effective catalyst resulting in lower oil viscosity and higher recovery.
- **Effect of Temperature, Phase Change, and Chemical Additives on Wettability Alteration During Steam Applications in Sands and Carbonates** investigates the mechanisms of steam-induced wettability changes in different rock systems caused by the phase change of water and chemical additives, and demonstrates that phase change at elevated temperatures is the most dominant factor affecting steam-induced wettability alteration.
- **Field-Scale Modeling of Hybrid Steam and In-Situ-Combustion Recovery Process in Oil-Sands Reservoirs Using Dynamic Gridding** demonstrates the use of dynamic gridding significantly reduces computation time while maintaining computation accuracy in modeling a hybrid steam-and-combustion recovery process for a typical Athabasca Oil Sands reservoir.
- **Formation Damage Associated With Mineral Alteration and Formation of Swelling Clays Caused by Steam Injection in Sandpacks** demonstrates mineral transformation and the neoformation of swelling clays can be caused by hydrothermal processes and may result in formation damage depending on physicochemical conditions and initial mineralogy.

Reservoir Management

- **Role of Infill Drilling in Increasing Reserves of the Western Desert of Egypt: Case Studies** presents key findings and lessons learned of an extensive infill-drilling campaign for nine fields in the Western Desert of Egypt that indicates heterogeneity may be the most important indicator to judge the benefit of infill wells.
- **Waterflood Performance Analyses for the Bhagyam Viscous Oil Reservoir** provides insight into the performance of the Bhagyam viscous-oil waterflood that attributes a significantly worse-than-expected outcome to a higher degree of heterogeneity and the possibility of a small amount of solid wax in the pore system.

Gas Hydrate Development

- **Some Technical Considerations of Gas-Hydrate Development from Chinese Permafrost Regions** presents a technical evaluation of permafrost regions in China that show Mohe Basin, Qilian Mountain, and Qinghai-Tibet Plateau hold promise for gas-hydrate accumulation based on identifiable source rock, migration path, reservoir seal, and others.

Jasper Ring, *SPE Res Eval & Eng* Executive Editor,
Chevron Europe, Eurasia and Middle East E&P

Thank You to Our 2019 Reviewers

SPE Reservoir Evaluation & Engineering extends its sincere appreciation to everyone who provided a technical review for at least one paper during 2019. Many of our reviewers contributed their expertise to more than one paper during the year. We recognize the time commitment these individuals have made in agreeing to review papers and appreciate the impact that their efforts have had on the published papers throughout the year. Volunteers such as these individuals are essential to ensuring that the journal publishes manuscripts of high quality and lasting value. Thank you to our dedicated reviewers for their contributions.

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Editorial Notes

SPE is proud to announce that *SPE Journal* and *SPE Production & Operations* are celebrating milestone years with their 25th and 35th volumes, respectively. In the first issues of 2020, *SPE J* editors recommend “Unlocking the Potential: Understanding the Psychological Factors That Influence Technology Adoption in the Upstream Oil and Gas Industry” (SPE-198903-PA), while *SPE PO* offers an interesting grouping of papers on acid stimulation, among other topics. *SPE Reservoir Evaluation & Engineering* delves into the subjects of unconventional reservoir development, enhanced oil recovery, and petrophysics with their selection of high-quality peer-reviewed papers.

SPE Reservoir Evaluation & Engineering staff would like to thank outgoing executive editor **Jesús Salazar**, Marathon Oil, for his service to the journal and introduce the executive editor team for 2020.

First, we welcome back **Jasper Ring**, who is entering his third year as executive editor of *SPE Reservoir Evaluation & Engineering*. He previously served as technical reviewer and associate editor for the journal and received *A Peer Apart* status in 2011 for reviewing 100 or more papers. Dr. Ring is Asset Manager for the Kurdistan Region of Iraq for Chevron Europe, Eurasia and Middle East E&P, and has held various positions in field development, reservoir management, and technology since joining Chevron in 1991. He holds BS and MS degrees in petroleum engineering from the University of Louisiana at Lafayette and a PhD degree in petroleum engineering from Texas A&M University.

We also welcome **Turhan Yildiz**, Red Rocks Engineering, to the *SPE Reservoir Evaluation & Engineering* Editorial Board in his new position as executive editor for formation evaluation. Dr. Yildiz previously served as an associate editor for the journal.

As part of broader efforts to adopt scholarly publishing best practices and streamline our submission, peer-review, and production processes, author biographies will no longer be required for publication in SPE journal papers. This is a rolling change that initiated in November 2019, so in the coming months, readers will see a mix of papers published with and without biographies until the rollover is complete.

2018 *SPE Reservoir Evaluation & Engineering* Impact Factor: 1.807