

# **SPE International Conference and Exhibition on Formation Damage Control 2024**

Lafayette, Louisiana, USA  
21-23 February 2024

ISBN: 978-1-7138-9434-6

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2024) by Society of Petroleum Engineers  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2024)

For permission requests, please contact Society of Petroleum Engineers  
at the address below.

Society of Petroleum Engineers  
P. O. Box 833836  
Richardson, Texas 75083-3836

Phone: (800) 456-6863  
Fax: (972) 952-9435

[books@spe.org](mailto:books@spe.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## **CASED-HOLE SAND CONTROL**

A Wholistic Approach for Successful Chemical Sand Consolidation Treatments in High Sand Producing Wells.....	1
<i>I. Mokogwu, T. Tran, T. Gilmer</i>	
Lessons Learned During Sand Control Operations in the Gulf of Mexico where Bridging is a Strong Possibility .....	17
<i>D. L. Cotrell, R. Wood, D. Stanley, S. Chaudhary, M. Chavez, R. Hill, R. Hollier, D. Alonso</i>	
Development and Field Testing of a New Diverter Sub Model for Gravel Pack Operations .....	35
<i>Kesavan Govinathan, Raymond Tibbles, Philip Wassouf, Samyak Jain, Elvy Samuel, Noppanan Nopsiri, Kasim Selamat</i>	
Assessment of Sand Control Methods for Cased Dual-Annulus Gas Wells: Scaled Laboratory Experiments.....	48
<i>R. Miri, M. Salimi, S. Stewart, J. M. Bermudez, C. Mazo, A. Nouri</i>	

## **KNOWLEDGE SHARING EPOSTERS I**

Fines Migration Control in Sandstone Reservoirs: DLVO Modeling for Critical Salt Concentration and Critical Flow Rate Prediction .....	60
<i>Rizwan Muneer, Peyman Pourafshary, Muhammad Rehan Hashmet</i>	
Nanofluids as a Promising Solution for Stabilizing Asphaltenes and Improving Oil Recovery in Mature Fields.....	79
<i>J. C. Cardenas, M. G Jaimes, R. Castillo, R. Dorado, J. C. Patiño, A. Prada, H. Galvis, O. R. Conde</i>	
Non-Damaging Nano Polymeric Product Enhances Bridging Agents Packing for Limestone Reservoirs in the Persian Gulf.....	96
<i>G. Pietrangeli, L. Hayden, A. Addagalla</i>	

## **HYDRAULIC FRACTURING AND DESIGN**

Deepwater Application of Proppant Controlled Release Inhibitor Leads to Successful Well Production in Gulf of Mexico.....	107
<i>N. Spurr, D. Stanley, M. Usie, F. Debenedictis, D. Schneider, A. Lawler</i>	
Successful Application of Pillar Fracturing in High Permeability Sandstone: An Injector Well Case Study in a Heavy Oil Field .....	117
<i>A. Quintero, E. Sepúlveda, J. Reina, Halliburton, D. Morales, E. Rodriguez, O. Clavijo</i>	
Experimental Study of Self-Degrading Diverting Agent Particles Used for Improving Hydraulic Fracture Placement.....	127
<i>V. Cosmin Trif, V. Aurelian Ganea, I. Foidas</i>	
Improved Completions and Fracturing Technology Enhances Efficiency and Sustained Oil and Gas Production .....	147
<i>Zillur Rahim, Mark Watson, Stuart Wilson, Pablo Barbero</i>	

Tackling Well Productivity and Sustainability in a Jurassic Horizontal HPHT Well with the First Multistage Unconventional Hydraulic Fracturing in MFS Formation: A Case Study of an Exploration Well.....	159
<i>A. Bosalhah, S. Al-Mulla, V. Duggirala, M. Ayyavoo, M. B. Al-Saqabi, A. Mubarak, A. Salem, P. Enkababian, L. Peiwu, M. Fituri, V. Pochetnyy</i>	

## **CARBONATE ACIDIZING**

Completion and Stimulation Design Evolution in Tight Chalk Formations in Offshore Norway .....	181
<i>M. Nozaki, N. R. Zwarich, M. Prosvirnov, R. Ruysschaert, M. A. Habib, L. A. Johnson</i>	
New Advances in Single-Phase Retarded Acids for Stimulating Carbonate Reservoirs .....	207
<i>S. Danican, D. Gettemy, K. Izundu, M. Ziauddin, T. Yusuf, P. Abivin, P. M. J. Tardy, C. Daeffler</i>	
Achieving Resurgence in Underperforming Wells: The Winning Combination of Coiled Tubing Intervention paired with Single Phase Retarded Inorganic Acid System – A Story of Success from South-East Kuwait.....	222
<i>Baraa Sayyar Alshammari, Mohamed Hedi Slama, Kareem Badrawy, Rustem Sunagatov, Sergio Rondon Fajardo, Mohannad Adel Sebahh, Nitin Rane, Mariam Mohammed Abdullah Al-Adwani, Lamyaa Alotaibi, Mohammad Khaled Al-Mousharji, Hamad Saeed Al-Mehanna</i>	

## **FORMATION DAMAGE DUE TO DRILLING AND COMPLETIONS**

Experimental Characterization of Linear Swelling of Reactive Clays Dominated Wells: Comparison of Drilling Fluid Systems .....	235
<i>Nabe Konate, Saeed Salehi, Mehdi Mokhtari, Ali Ghalambor</i>	
Long-term Coreflood Testing with Biopolymers—A Laboratory Investigation Showing How Return Permeability Improves From 0 to 100 Percent by Getting a Critical Parameter Right.....	248
<i>S. Howard, Montgomery, Tx</i>	
Comparative Experimental Study of High-Density Drilling and Workover Fluids.....	268
<i>Abdullah. M. Al Moajil, Ahmed. G. Alghizzi, Sinan. Caliskan, Tariq Almubarak</i>	
Novel, Solids-Free, Oil-Based Drill-In Fluid Additive for High-Density Applications .....	286
<i>G. Nielsen, J. Baker, D. Thompson, D. Messler</i>	
The Value of Underbalanced Coiled Tubing Drilling UBCTD in Unconventional Mature Fields: Decision Analytic Approach.....	294
<i>Maher. Falih. Al-Sharea</i>	

## **CO2 STORAGE CHALLENGES**

Fines Migration Associated with Rock Dry-Out During CO2 Injection .....	305
<i>C. Nguyen, G. Loi, N. N. Zulkifli, M. I. Mahamad Amir, A. A. Abdul Manap, S. R. Mohd Shafian, A. Badalyan, P. Bedrikovetsky, A. Zeinjahromi</i>	
Formation Damage in CO2 Storage Wells – The Same, But Different .....	315
<i>M. Byrne, R. Gilbert, R. Anderson</i>	
Mechanistic Modeling of Wellbore Integrity During CO2 Injection in Deep Saline Aquifers.....	327
<i>Jawad Ali Khan, Andreas Michael</i>	

Formation Damage During CO2 Storage: Analytical Model, Field Cases .....	350
<i>Amin Shokrollahi, Kofi Ohemeng Kyei Prempeh, Syeda Sara Mobasher, Parker William George, Nazliah Nazma Zulkifli, Abbas Zeinijahromi, Pavel Bedrikovetsky</i>	
Mechanisms of Degradation of Cement in CO2 Injection Wells: Maintaining the Integrity of CO2 Seals .....	374
<i>Miki Mura, Mukul M. Sharma</i>	
Return Permeability and Critical Velocity Testing: Formation Damage in CO2 Storage Projects .....	389
<i>Yani Araujo De Itriago, Clara Palencia, Phillip Singletary</i>	
An Analytical Model for Water Evaporation During CO2 Injection for Geological Storage .....	397
<i>T. L. Russell, P. Bedrikovetsky</i>	

### **KNOWLEDGE SHARING EPOSTERS**

A Deep Learning Framework for Thermal Enhanced Oil Recovery Optimization of Hydrogen from H2S – A Maari Reservoir Study .....	415
<i>Klemens Katterbauer, Abdulaziz Qasim, Abdallah Al Shehri, Ali Yousef</i>	
Productivity Decline due to Fines Migration Associated with High Water Cuts .....	425
<i>T. Russell, C. Nguyen, G. Loi, S. R. Mohd Shafian, N. N. Zulkifli, S. C. Chee, N. Razali, A. Zeinijahromi, P. Bedrikovetsky</i>	
Enhancing Dispersion Test Analysis for Shale Drilling: Particle Size Distribution and Cation Exchange Insights.....	441
<i>Bitao Lai, Jihong Wang, Wenwu He, Zhipeng Wan</i>	

### **KNOWLEDGE SHARING EPOSTERS II**

Wellbore Integrity Challenges in Saltwater Disposal: Case Study on the Fort Worth Basin .....	453
<i>Jawad Ali Khan, Andreas Michael</i>	
Maximizing Production Recovery Through Innovative Formation Damage Treatment .....	478
<i>E. Moen, R. Antonsen, E. A. Ejofodomi</i>	
A Workflow for Circulation Rate Optimization to Exploit Enhanced Geothermal System Productivity .....	485
<i>Rahman Ashena, Ali Ghalambor, Mahmood Bataee, Vinesh Thiruvellam</i>	
Polymer Induced Permeability Reduction: The Influence of Polymer Retention and Porous Medium Properties.....	496
<i>Khaled Zidan Abdelgawad</i>	

### **FORMATION DAMAGE ISSUES**

Modelling Approach to Predict and Mitigate Formation Damage Due to Halite Deposition During CO2 Storage in Saline Aquifers.....	510
<i>Oluwatosin Matthew Ogundipe, Eric James Mackay, Oscar Vasquez</i>	

## **PRODUCTIVITY ENHANCEMENT**

Nano Relative Permeability Modifier (NanoRPM): A Promising Solution for Water Control in Colombian Oilfields .....	524
<i>J. C. Cardenas, E. Ariza, R. Torres, J. C Patiño, M. G Jaimes, A. Prada, O. R. Conde, H. Galvis</i>	
Application of Nanofluids for Altering Wettability in Heavy Oil: A Field Test .....	546
<i>J. C. Cárdenas, M. Jaimes, R. Dorado, H. Galvis, O. R. Conde, A. Prada</i>	
Reservoir Sandstone Wettability in Relation to Injection Water Salinity and Reservoir Temperature .....	563
<i>Dhrubajyoti Neog, A. S. Rahman, Pradip Borgohain</i>	
Analyzing Gas Well Productivity Change with Production in Unconsolidated Sandstone Using Rate Transient Analysis .....	584
<i>Anand Kumar, Pratik Marandi, Deepak Verma</i>	
The Road for Successful Assessment of Completion Placement in Horizontal Wells.....	605
<i>Ahmed Ghanmi, Mustafa Bawazir</i>	

## **INJECTIVITY ISSUES**

Laboratory Procedures for Estimating the Impact of Solids and Oil-Emulsions Content in Synthetic and Real Produced Water on the Injection Pressure Drop Over Outcrop Sandstone Cores.....	617
<i>J. Beeder, E. Kowalewski, I. E. Pedersen, R. M. Wat, C. Pryme, A. Ø. Ekelund, D. C. Standnes</i>	
Advancements in Evaluating Formation Damage in Water Injector Wells: A Comprehensive Methodological Approach .....	635
<i>J. C. Cardenas, M. A. Escobar, A. Prada, M. Jaimes, O. R. Conde, H. Galvis</i>	
Enhanced Injectivity Using Diversion Technology on Hydraulic Fracturing Jobs in Los Llanos Basin.....	647
<i>A. Quintero, E. Sepúlveda, J. Reina, J. Bahamón</i>	
Engineering for Success: Design and Execution of Fluids for Optimum Injectivity - A Case Study .....	661
<i>Christer Storli, Arne Asko, Allan Twynam, Knut Hovem, Dave Knox, Brittany Granger Thibodeaux, Alessandro Cascone, Abdalla Kamel</i>	

## **OPEN-HOLE SAND CONTROL**

Maximizing Slim Hole Well Deliverability: First Installation of 3.5" Alternate Path Open Hole Screen in Indonesia and Implementation of Erosional Velocity Analysis .....	684
<i>S. Herputra, J. K. Sare, R. Binilang, B. Pande, M. Sentunata, M. Rossi, P. A. Merati, L. H. Hosen, N. Kurniawan</i>	
A Comprehensive Review of Techniques Enabling OHGP Completions in Low Frac Window Environment .....	703
<i>M. Beldongar, B. Gadiyar, J. Jeanpert, A. Yeneapre, M. Bouguetta</i>	
Gravel Pack Optimization in Frade Field Through Bottomhole Data Analysis.....	717
<i>C. Latini, K. Govinathan, R. Tibbles, S. Jain, P. Wassouf, E. B. Pereira, L. F. Neumann, V. F. Rodrigues, T. Andrade</i>	

Multiphase Flow Pattern and Screen Selection: Two Overlooked Parameters Essential to Reservoir Control Valve Optimization.....	726
<i>C. A. Malbrel, R. Kale, J. Agarwal, K. Gohari</i>	

Breaker Placement in Sand Control Lower Completions – New Challenges and Potential Solutions .....	739
<i>M. Byrne, L. Djayapertapa, K Watson</i>	

### **SANDSTONE ACIDIZING**

Producer Acid Stimulation to Remove Near Wellbore Damage in Unconsolidated Sandstone Reservoirs: Lessons Learned, Best Practices and Challenges in Penglai Oilfield, Bohai Bay .....	748
<i>Jv Zheng, Yanxu Zhang, Xianghui Dai, Yuejie Wang, Wentao Li, Yangyang Fu, Xinjun Gou, Jun Cao, Ning Zhao, Changwei Li, Zuan Liao, Qingzhen Cui</i>	

Viscoelastic Nanomaterials and Surfactants for High-Performance Well Enhancement.....	760
<i>R. C. Advincula</i>	

Acid Stimulation Case Study in Deepwater GoM.....	767
<i>M. Farinas, C. Akajagbor, C. Vreeling</i>	

Investigating the Extent of the Impact of Acetic Acid as Halite Precipitation Reduction Agent for Enhancing CO2 Injectivity in Deep Saline Aquifers .....	775
<i>Victor Darkwah-Owusu, Muhammad Aslam Md Yusof, Yen Adams Sokama-Neuyam, Bennet Nii Tackie-Otoo, Joshua Nsiah Turkson, Sunil Kwon, Lee Jang Hyun, Ingebret Fjelde</i>	

### **CASE HISTORIES**

How High-Resolution Visualisations and Quantifications Gave Insight into Damaging Mechanisms and Treatment Fluid Performance in Omani Carbonate Reservoirs .....	791
<i>J. Green, I. Patey, L. Wright, P. Zonjee, S. Al Hosni, O. Al Mamari</i>	

An Integrated Study with an Effective Strategy Leads to a Great Discovery in a Challenging Fractured Jurassic Reservoir in West Kuwait .....	822
<i>Ahmad Binsafar, Abdullah Al-Ibrahim, Mani Maran Ayyavoo, Fahad Al-Otaibi, Anwar Ibrahim, Omar Al-Khlaifi</i>	

A Case Study of Enhancing Reservoir Performance Through Protecting the Matrix.....	832
<i>Byron Cottingham, Charles Landis, Ph. D., Josh Jordan, Chad Hall</i>	

Optimal RDIF & Breaker Design for Horizontal SAS ICD Completions: A US Gulf Coast Land Case Study.....	844
<i>S. Riley, B. Granger-Thibodeaux, D. Hembling</i>	

Two Phase and Single Phase Nitrified Gas Drilling on Sour Depleted Formation – Case History .....	860
<i>Muhammad Murtaza, Maurizio Arnone, Ahmad Ali Rafi Ahmad</i>	

A Successful Alternative for Water Control and Reduction of Bypassed Pay in a Heavy Oil Reservoir: Case Study in Yuralpa Field, Ecuador.....	873
<i>Rubys M. Hernandez, Nayda G. Teran, A. F. Rios, D. V. Bastidas, J. A. Vega, H. E. Mora, A. S. Martinez</i>	

### **Author Index**