

# **Caspian Technical Conference & Exhibition 2024**

**Atyrau, Kazakhstan  
26 - 28 November 2024**

ISBN: 979-8-3313-1757-7

**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. (2025)

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

## AI AND DIGITAL TRANSFORMATION: I

Enhancing Safety Data Analysis Through Machine Learning Models .....	1
<i>K. Kazbekova, Karimzhanov Zhakhongir, Makhmut Akerke</i>	
Early Signs of Gas Recognition Based on Machine Learning Analysis of Passive Acoustics .....	9
<i>Yu. Maslennikova, V. Nagimov, L. Khakimullina, A. Koloda</i>	
Proven Advanced Data Science Techniques for Improved Automated Lithology Classification Using Well Log Data .....	19
<i>Alikhan Kurmankulov, Zhanat Kurmankulova</i>	

## ADVANCES IN WELL COMPLETION

Nitrified Acid Fracturing Treatments in HPHT Carbonate Formations: Results of the Large Campaign in the Middle East .....	35
<i>A. Bretzer, A. Yudin, N. Nurlybayev, Z. Al-Jalal, M. Faisal, Y. Solihin, R. Sanchez</i>	
Multi-Stage Selective Completion and Acid Stimulation, Karachaganak Field, Kazakhstan.....	45
<i>Timur Naurzgaliyev, Timur Agambayev</i>	
Managed Pressure Drilling and Managed Pressure Cementing: Adapted Set of Equipment to Improve Well Construction Efficiency in Complex Geological Conditions.....	60
<i>Fuad Aliyev, Almas Kaidarov, Yan Yanturin, Ivan Alekseyev, Madina Myrzabayeva, Andrey Magda</i>	
Water Wells Injectivity Enhancement via Hydraulic Fracturing in Open Hole Completions .....	71
<i>A. Yudin, E. Eltaher, A. Alyaseen, Z. Al-Jalal, M. Faisal</i>	

## FRACTURING AND STIMULATION

Acid Fracturing Design Modifications with the Development of a Tight Deep Carbonate Reservoir .....	81
<i>A. Kydyrgazy, A. Yessaliyeva-Gozukara, S. Schomaker, A. Bibolova, D. Issayev, A. Azhigaliyeva, A. Berdibekov, R. Manakhayev, N. Tlepbergenov, Yong Fan, A. Slobozhaninov, R. Kruglov</i>	
A Comprehensive Workflow of Friction Pressure Calibration Improves Decision Making in Critical Fracturing Operations in the Middle East.....	89
<i>Y. Galimov, A. Yudin, N. Nurlybayev, Z. Al-Jalal</i>	
Analyzing the Productivity Impact of Propped Hydraulic Fracturing at Karachaganak Gas Condensate Field: A Simulation Study .....	100
<i>Abdulmalik Ibragimov</i>	
Fluid Design for Acid Fracturing and Stimulation in HT Reservoirs Accounting for Cooldown Effect Based on Measurements and Simulation .....	110
<i>A. Yudin, J. Rivas, M. Farouk, Z. Al-Jalal, N. Nurlybayev, W. Kharrat</i>	

High-Frequency Pressure Monitoring Algorithm Improves Effectiveness of Multistage Fracturing with Chemical Diverter in Pre-Opened Ports .....	121
<i>Alexey Borisenko, Andrey Fedorov, Ainur Akhunov, Roman Akimov, Dmitry Tetyuk</i>	

## **PRODUCTION OPTIMISATION**

Advantages of a Staged Approach in Horizontal Well Clean-Up.....	128
<i>Z. Yermekbayeva, A. Yessaliyeva-Gozukara, D. Williams, D. Bopbekov, K. Yudin, D. Utebaeva, K. Oryngaliyev, N. Tlepbergenov, A. Berdibekov, I. Kussanov, A. Chalak</i>	
Wastewater Disposal Wells Management and Injectivity Remediation Approaches .....	137
<i>Nursultan Bakyt, Assylzhan Zhetpissov, Rustem Gubashov, Dinara Utebaeva, Akylbek Kamispayev, Arman Nurmukhanbetov, Khussain Oryngaliyev</i>	
A Comprehensive Study of the Various Stimulation Fluids Deployed in HPHT Reservoirs.....	149
<i>N. Nurlybayev, A. Yudin, A. Bulekbay, R. Jalil, M. Ghazwi, M. Farouk, Z. Al-Jalal, F. Al Hadyani</i>	

## **GEOSCIENCE I**

Application of Oil Fingerprinting and Biomarker Analysis to Study Fluid Connectivity and Reservoir Isolation and Genetic Typing of Oil Obtained from the Eastern Caspian Basin (Kazakhstan).....	161
<i>Yessimkhan Seitkhaziyev, Tolganay Jarassova</i>	
Using Borehole Image Logs to Refine Reservoir Architecture for Carbonate Reservoir Models, Korolev Field, Republic of Kazakhstan.....	177
<i>J. W. Bishop, T. Playton, A. Bibolova, F. Correa Mora, M. Sargunanov, M. Hanschitz</i>	
The Potential Lenses Oil Reservoir Discoveries and Exploitation in the Northern United Arab Emirates.....	196
<i>S. Balhasan, I. A. Magomadov, T. K. Kassymov, R. Iskakov, A. Abdenabi, N. S. Uzdieva, B. Iskandar, B. Khameiss, M. Al Asfoor, S. Qaysi, Y. Abushalah</i>	
Practical Aspects of Discrete Fracture Network Modelling with Neural Network Assisted Integration of Available Data.....	223
<i>S. E. Togaev, A. V. Gavrilov, K. A. Abidov, V. L. Frik</i>	

Gaussian Inversion-Assisted Automated History-Matching Workflows for 3D Reservoir Models with Multiple Geological Boundaries.....	241
<i>Saunil Rajput, Vishal Kumar, Velerian Sanjao Lopes, Abhijeet Sharma, Arvind Kumar, Tety Benedicta Wydiabhakti</i>	

## **REACHING NEW HORIZON IN DRILLING TECHNOLOGY**

A Case Study: Drilling Longest Horizontal Extended Reach Well with Managed Pressure Drilling System in West Kazakhstan.....	256
<i>Dinara Kaisagaliyeva, Alibek Armiya, Amilina Kairzhanova, Akzharkyn Tilekkabyl, Dastan Takhanov, Anvar Ismukhambetov, Alibek Katenov, Kuanysh Kabiyev, Timur Gabdulov, Nurzhan Kamzayev, Zhanibek Rakhatov, Diana Amangeldiyeva</i>	

Effective Planning and Execution of the Longest Well in Kazakhstan in the Lower Slope Region of Tengiz Field.....	277
<i>N. Kalzhekoy, I. Kussanov, Y. Kabyiyev, R. Manakhayev, N. Jumamukhambetov, A. Yessaliyeva-Gozukara, D. Issayev, U. Zhumadilov, S. Kabdenov</i>	

## **HUMAN CAPITAL, HSE AND ENERGY TRANSITION**

Advanced Geothermal Well Testing Proves Sustainable New Energy Potential .....	289
<i>T. Pham, Y. Kaipov, A. Maurya, A. Alawagi</i>	
Using Ultra-Low Emission Burner for Zero Gas Flaring in Oil Fields .....	300
<i>I. A. Magomadov, S. Balhasan, F. Wahid, T. B. Izturgenov, R. Iskakov, A. Hamad, V. Lyakhovskaya, Z. Hassan, M. Duot, Y. Ame, I. Sageer</i>	
Implementation of Smart Leak Detection and Repair Program at ADNOC Distribution's Oil Storage Facilities .....	312
<i>B. Ali, A. Ali, M. Harbi</i>	

## **REAL-TIME OPERATIONS AND MONITORING**

Integrated Workflow for Daily Automated Calibration of Wellhead Choke & Flow Line for a Mega Surface Network in a Giant KOC Onshore Asset.....	324
<i>Irinel Gabriel Marcu, Walid Mohamed, Hamad Salem Al Rashedi, Allen Roopal, Nada Saleh</i>	
Simultaneous Determination Technology for Water Content and SARA Group Composition of Oil in Water-Oil Emulsions Using NMR Relaxometry .....	333
<i>M. Fazlyyyakhmatov, R. Bakhtigaraev, M. Varfolomeev</i>	
Pore-to-Process Automated Production Enhancement Workflows.....	341
<i>U. Gogoi, B. Bhatt, N. Gusain, M. Gupta, P. Pitla, R. Sahmkow, A. Saxena, A. Dhiman, S. Shinde</i>	

## **RESERVOIR DESCRIPTION AND DYNAMICS II**

A Systematic Approach of Bottomhole Pressure History Matching for the Giant Carbonate Kashagan Field .....	356
<i>Medet Madalimov, Li Dachang, Ehighebolo Ibvade Thaddeus, Dair Yerkinbek</i>	
Molecular Dynamic Prognosis for Ti-C10H16N2O8 Filter Cake Decomposition .....	373
<i>S. Irawan, D. D. K. Wayo, E. Bayramov, M.T. Fathaddin, L. Goliat</i>	
Water Injection Below Water-Oil Contact in Fractured Carbonate Reservoir. South Turgai Basin Field Case Study .....	387
<i>A. R. Mukhanov</i>	
Characterizing Complex Fluvial System Using Integrated Geological and Geophysical Analyses in the Jurassic Sediments in the Southern Part of the Northern Ustyurt Basin .....	396
<i>T. Bashimova, S. Yessalina, B. Durmagambetov, A. Kuvanyshov, D. Kovyazin</i>	
Successful Implementation of Integrated Forecasting Tool for Complex Near Critical Jurassic Reservoir Fluids of North Kuwait .....	409
<i>Nawaf Al-Enizi, Ali Abbas Ameer, Ali Al-Saffar, Sara Ben Khalaf, B. Abdullah, Narhari Rao, Umut Karamahmut, John Rice</i>	

## **PROJECT MANAGEMENT**

Agile Delivery of Business through Integrated Planning, Application of Minimum Functional Objective and Digitization .....	430
<i>K. Ussenbayeva, T. Munbayev, A. Skopich, D. Utebaeva, A. Chalak, E. Iskakov, K. Zhumagulov, U. Akimkulova, R. Shomirov</i>	

Navigating Technical and Assurance Challenges and Solutions in Joint Ventures: A Case Study of KMG Nabors Drilling Company LLP .....	439
<i>G. Darab, S. Tleugaliyev</i>	

## **RESERVOIR DESCRIPTION AND DYNAMICS III**

Tailoring Petroleum Reservoir Simulation Techniques for Modeling Uranium In-Situ Leaching Process .....	447
<i>Y. Umurzakov, A. Meiman, A. Nurkas, A. Kurmankulov, A. B. Bigeldiev, A. Kuvanyshev, B. Amangaliyev, M. Zhabagenov, A. Yorillo, T. Oppeneau</i>	

Well Management Logic Optimization: Simulation Case Study on Kashagan Field .....	458
<i>Nurbol Nogerbek, Kurnia Pradja, Gulnara Galiyeva, Sharjeel Hayat</i>	

Comprehensive Usages of Multi Detector Pulsed Neutron Logging Tools to Overcome Mature Field's Challenges: Case Study from ACG Field .....	468
<i>Rizvan Ramazanov, Xiaogang Han, Adrian Zett, Fuad Atakishiyev</i>	

Relative Permeability Measurements Using Different Fluid Systems in an Unconsolidated Sandstone Reservoir .....	481
<i>M. R. Dernaika, B. Mansour, M. Konda, D. Klemin, R. Bhakta, M. A. Gibrata, Q. Huang, L. Rouis, G. Ameish, Magdi Eldali</i>	

## **AI AND DIGITAL TRANSFORMATION: II**

Integrating Multi-Source Experiment Data and Variational Diffusion Model for Intelligent Constructing Digital Core: A Case Study of Sandstone Reservoir in the Turgay Basin Central South Kazakhstan .....	508
<i>Lian Wang, Liang Zhang, Rui Deng, Hehua Wang, Xing Zhao, Bing Xu</i>	

Asset and Materials Data Enrichment Automation using Computer Vision and Large Language Model .....	524
<i>S. Ispayev, N. Khamzin, O. Revkova, B. Uanassov, M. Sison</i>	

SimOps Maps: A New Approach to Operational Efficiency in the Oil and Gas Industry .....	536
<i>M. Russayev</i>	

## **GEOSCIENCE II**

Collaborative Evolution: Transforming Korolev Infill Wells from Single Wells to Mutli-Well Pad with Optimal Targets .....	547
---	-----

*Duman Issayev, Ulan Zhumadilov, Kalampyr Baktybayeva, Amanbay Chalak, Ilyas Kussanov, Nurdaulet Jumamukhambetov, Nurymbet Kalzhekov, Ruslan Manakhayev, Samat Kabdenov, Kymbat Dagistanova*

Fracture Characterization by Integrating Seismic-Derived Attributes with Production Well Data in an Offshore Super-Giant Carbonate Field, North Caspian Basin .....	558
<i>M. Zh. Taubassova, A. M. Gabdullin</i>	

AI Seismic Interpretation: Improving Our Understanding of the Subsurface .....	572
<i>H. Whittaker</i>	

Advanced Oil Fingerprinting Technology for Enhanced Reservoir Characterization and Development .....	580
<i>M. Shipaeva, A. Shakirov, D. Nurgaliev, V. Sudakov, M. Fazlyyyakhmatov</i>	

Prediction and Application of Pore Pressure for Carbonate Reservoirs in Zhongjiang–Penglai of China .....	589
<i>Guo Xinyu, Tang Ming, He Shiming, Zou Lu, Zhou Yemiao, Zhang Guangfu</i>	

## **WELL INTEGRITY AND PRODUCTION STRATEGIES**

Tengizchevroil Well Unloading Challenges and Best Practices at Higher Gathering System Pressure .....	604
<i>S. Bekov, A. Kuatov, K. Oryngaliev, A. Nurmukhanbetov, A. Kamispayev</i>	

Micro Tubing Leak Investigation with High Resolution Detection Technology and Leak Remediation with Pressure Activated Sealant – A Case Study .....	617
<i>Azamat Kantarbayev, Tilek Jumamukhambetov</i>	

Evaluation of Nondamaging Sand Control Method for Reducing Sand Production at the Caspian Depression Field.....	630
<i>Aizhan Zeinula, Dmitriy Abdrazakov, Karim Asanov, Ruslan Kruglov, Danabek Kaziyev</i>	

Best Practice Case to Improve Oil Recovery: Revisit of the Largest Oilfield in China .....	642
<i>X. G. Lu, S. Q. Sun, J. H. Xu</i>	

Caged Flowmeter Enhancement for Sour, HP/HT, High Flowrate Applications .....	668
<i>Yerbol Aizharikov, Azamat Kantarbayev, Tilek Jumamukhambetov, Vikas Punia, Trevor Beresford</i>	

## **RESERVOIR DESCRIPTION AND DYNAMICS I**

New Reserves Classification in Kazakhstan. Will it Happen Now? .....	678
<i>A. R. Mukanov, A. Jussupbekova</i>	

Well Interference Test in Naturally Fractured Gas Reservoir: Numerical Simulation and Impact on Reservoir Performance Forecasting.....	685
<i>A. V. Gavrilov, S. E. Togaev, E. N. Limanskii, K. A. Abidov</i>	

## **FACILITIES AND OFFSHORE OPERATION**

An Alternative Approach of Polymer Flooding Implementation for the Fields of Kazakhstan .....	702
<i>B. Sahuc, E. Engles, Z. Abirov</i>	

Deformation Monitoring of Northern Caspian Sea Kashagan Oilfield Using Radar Satellite Remote Sensing .....	715
<i>E. Bayramov, G. Tessari, M. Kada, S. Aliyeva, M. Buchroithner, J. Neafie, A. Duisenbiev</i>	

Advancing Aboveground Storage Tank Integrity: Exploring and Implementing Online Robotic Inspection .....	724
<i>B. Krishnan, A. Ali, M. Al Harbi, E. Natarajan</i>	

## **DRILLING OPERATIONS OPTIMIZATION**

Optimizing Drilling Operations with Slimhole Sidetracking Techniques: Challenges and Solutions .....	740
<i>Elshan Ismayilov, Gunduz Mahmudov</i>	
Cloud-Based Digital Solution: A Modern Approach to Casing Design for Tengizchevroil Complex Wells.....	749
<i>Z. Rakhmetov, A. Morrison, N. Kamzayev, Y. Mulyukova, C. Majumdar, P. Temple</i>	
Characteristic of Pulse Displacement in Cementation of Vertical Well Washout .....	763
<i>Zhuangzhuang Zhang, Zhongwei Huang, Shuailin Li, Gensheng Li</i>	

## **UNCONVENTIONAL RESOURCES DEVELOPMENT**

Addressing the Near-Wellbore Injectivity Limitations while Fracturing Highly Pressurized Formations.....	773
<i>A. Yudin, M. Dawoud, W. Arshad, N. Nurlybayev, Z. Al-Jalal, J. Lizcano, C. McCollum</i>	
Rock Typing and Differentiated Study of Filtration Properties of a Fractured Carbonate Reservoir by Using ML Algorithms on the Example of a Deposit in Uzbekistan .....	787
<i>E. Kolbikova, R. Valiev, K. Yanidis, B. Suleimenov, J. Shakirova, A. A. Grachyov, A. Gavrilov, S. Togaev, K. Abidov, M. Tillyabaev</i>	
Analytical Technology for Assessing the Amount of Organic Matter and Extractable Bitumen in Unconventional Reservoir Rocks Using NMR Relaxometry .....	799
<i>B. Sakharov, N. Khasanova, M. Fazlyyyakhmatov, M. Varfolomeev</i>	

## **Author Index**