Production and Operations Symposium 2007

“Boom Times … or a New Reality?”

April 1-3, 2007
Dallas, Texas, USA
# TABLE OF CONTENTS

Retrieving Stuck Liners, Tubing, Casing, and Drillpipe With Vibratory Resonant Techniques .......................................................... 1  
Orlando J. Gonzalez

Real-Time Monitoring of Acid Stimulation Using a Fiber-Optic DTS System .................................................. 13  
Gualtieri, Halliburton Energy Services Inc.

Data Analysis of Barnett Shale Completions ............................................................................................... 23  
B. Griesier, B. Shelley, and B.J. Johnson, Halliburton, and E.O. Fielder, J.R. Heinze, and  
J.R. Werline, Devon Energy Corp.

Successful Flow Profiling of Gas Wells Using Distributed Temperature Sensing Data ............................................. 35  

Expandable and Contractable Bit .................................................................................................................. 51  
Sharad Ashok Agarwal, Maharashtra Inst. of Technology

Conventional Analysis for the Determination of the Horizontal Permeability From  
the Elliptical Flow of Horizontal Wells .................................................................................................. 54  
Freddy H. Escobar and Matilde Montelegre-M., U. Surcolombiana

A Literature Review on Smart-Well Technology .......................................................................................... 62  
Changhong Gao and T. Rajeswaran, Curtin U. of Technology, and Edson Nakagawa,  
CSIRO Petroleum Resources

ICD Screen Technology Used To Optimize Waterflooding in Injector Well ......................................................... 71  
A.G. Raffn, Reslink A/S; S. Hundsnes, Statoil ASA, and S. Kvemstuen and T. Moen, Reslink  
A/S

Staircase Lifting of Oil Using Venturi Principle: A New Artificial-Lift Technique ................................................. 93  
Siddhartha Gupta, Schlumberger

A Program for Acid Formulation in Stimulation Jobs—Merging Oilfield Chemistry  
and IT Towards Development of "Smart" Fields ......................................................................................... 104  
Adit Gupta, U. of Petroleum & Energy Studies, India

Efficient History Matching Through Production Data Selection ............................................................................ 109  
B. Liu, M.G. Kelkar, T. Gang, and T.N. Dixon, U. of Tulsa

A New Method of Calculating Water Invasion for Heavy-Oil Reservoir by Steam Injection ........................................ 121  
Hongen Dou, Chuanchun Chen, Yuwen Chang, and Xiaolin Wang, RIPED, PetroChina;  
Jun Yu, Liaohe Oilfield, PetroChina; and Fengan Wang, Daqing Oilfield, PetroChina

Hydraulic Fracture Model Sensitivity Analyses of a Massively Stacked, Lenticular,  
Tight Gas Reservoir ................................................................................................................................... 127  
Christopher A. Green, Perenco; Robert D. Barree, Barree & Assocs.; and Jennifer L.  
Miskimins, Colorado School of Mines

Estimating Fracture Reorientation Due to Fluid Injection/Production .............................................................. 137  
Zongyu Zhai and Mukul M. Sharma, U. of Texas at Austin

Decline Analysis for Horizontal Wells of Intercampo Field, Venezuela ......................................................... 150  
Hong’en Dou, Changchun Chen, and Yuwen Chang, RIPED, PetroChina; Yanjun Fang,  
Daqing Oilfield, PetroChina; Xinbin Chen, RIPED, PetroChina; Wei Liu, Liaohe Oilfield,  
PetroChina; and Wenxin Gai, CNODC, CNPC
Foam-Assisted Lift—Importance of Selection and Application ............................................... 162
B.P. Price and B. Gothard, Multi-Chem

Enhancing and Sustaining Well Production: Granite Wash, Texas Panhandle .................... 167
Stephen Ingram, Isaac Paterniti, and Richard Pauls, Halliburton, and Brian Rothkopf, Chris Stevenson, and John Conner, Forest Oil Corp.

Remediation of Production Loss Due to Proppant Flowback Through Coiled-Tubing Intervention ......................................................................................................................... 178

Pressure and Separation Performance of Oil/Water Hydrocyclones .................................... 195
Minghu Jiang and Lixin Zhao, Daqing Petroleum Inst.

New Tubingless Sucker Rod Pump System in Slimholes ........................................................... 200
Liu Yonghui and Li Yingchuan, Southwest Petroleum U.; Li Zhenzhi and Fan Xiyun, Zhongyuan Oilfield, Sinopec; and Zhou Xingfu, Southwest Sub-Company, Sinopec

Extendable Arm Drill Bit: A Novel Idea .......................................................................................... 207
Yash Gupta and Sudeepto N. Banerjee, Maharashtra Inst. of Technology

The Application of Expandable Tubulars in Casing While Drilling .............................................. 212
Yash Gupta and Sudeepto N. Banerjee, Maharashtra Inst. of Technology

Maximizing Well Productivity Through Water and Sand Management—A Combined Treatment ................................................................................................................................. 220
Philip D. Nguyen, Stephen R. Ingram, and Mauricio Gutierrez, Halliburton

Reorientation Refracturing Case Study .......................................................................................... 230
Fei Yao, China U. of Petroleum; Dingwei Weng and Yang Li, RIPED; and Yongbo Yu and Feng Hu, Daqing Oilfield Co.

EOS-Related Mathematical Model To Predict Sulfur Deposition and Cost-Effective Approach of Removing Sulfides From Sour Natural Gas .............................................................................. 236
Xiao Guo and Zhimin Du, State Key Laboratory of Oil and Gas Reservoir Geology and Exploitation; Haiyan Mei, Dekui Fu, and Xun Wang, Southwest Petroleum U.; and Xuefeng Yang, PetroChina Southwest Oil & Gasfield Co.

Identification of Production Potential in Unconventional Reservoirs ...................................... 243
Bill Grieser and Jim Bray, Halliburton

Producing the Well by a Compensated Pump .............................................................................. 249
Smil S. Buchman

Optimum Control of Unwanted Water Production in Stratified Gas Reservoirs .................. 254
Nampetch Yamali, Quoc P. Nguyen, and Sanjay Srinivasan, U. of Texas at Austin

Relative Permeability and Wettability of Rocks Obtained From Their Capillary Pressure and Electrical Resistivity Measurements .................................................................................................. 263
A.M. Attia, Suez Canal U., Egypt

The Effect of Tool Joints on ECD While Drilling ...................................................................... 276
Sarita Simoes, Mengjiao Yu, Stefan Miska, and Nicholas E. Takach, U. of Tulsa

Coiled Tubing Cement Packer Repair at Prudhoe Bay, History and Current Techniques ................................................................................................................................. 284

Simulation Study of Drilling Horizontal Wells in One of Iranian Oil Fields ......................... 290
Abbas Azarkish, Natl. Iranian Oil Co., and Elham Khaghani Kavkani, Petroleum U. of Technology, Iran

Reduction of Oil Droplet Breakup in a Choke ............................................................................ 302
Peter Jan Kwakernaak, Wim M.G.T. van den Broek, and Peter K. Currie, Delft U. of Technology, The Netherlands

An Improved Model for the Liquid-Loading Process in Gas Wells ........................................ 310
Frank van Gool and Peter K. Currie, Delft U. of Technology, The Netherlands
Reclaiming Lost and Forgotten Oil and Gas Through the Use of Solid Expandable Tubulars ................................................................. 316
Don Villemez, Enventure Global Technology L.L.C.

Multizone Completion With Accurately Placed Stimulation Through Casing Wall ......................................................... 323
Ron Hinkle and Matt Howell, Halliburton

Critical Conditions for Effective Sand-Sized Solids Transport in Horizontal and High-Angle Wells .................................................. 327
Mingqin Duan, Stefan Miska, Mengjiao Yu, Nicholas Takach, and Ramadan Ahmed, U. of Tulsa, and Claudia Zettner, ExxonMobil

Optimized Deep-Penetration Acid Fracturing Technology in Low-Permeability, Naturally Fractured, Complex Lithology Reservoirs ....................... 338
Yun Xu, Honglan Zou, and Qun Lei, Langfang Branch Research Inst. of RIPED, PetroChina; Zhanjun Liu, Yunmen Oilfield Co.; Yunhong Ding, Zhuhong Tian, and Yanli Yang, Langfang Branch Research Inst. of RIPED, PetroChina

Case Study from 12 Successful Years of High Temperature Fracturing in Bach Ho Field Offshore Vietnam ............................................. 345

An Integrated System for Risk Assessment of Drilling Operations in Oil and Gas Wells ................................................................. 355
A. Khatlan, A. Jafari, and A.A. Milani, U. of Tehran

Methane From Gas Hydrates Using Methanogens ......................................................... 361
Leo T. Abraham and Esha N. Varma, Maharashtra Inst. of Technology

R.A. Medina, Innovaciones Medina C.A.

A New Approach for Phase Behavior and Well Productivity Studies in the Deep Gas-Condensate Reservoir With Low Permeability .......................... 371
Zhilin Q. and Shouping Wang, Sinopec Zhongyuan Oil Field; Zhimin Du, Southwest Petroleum U.; Baosheng Liang, U. of Texas at Austin; and Ruijian Deng and Wei Zhao, Sinopec Zhongyuan Oil Field

A New Darcy-Stokes Flow Model for Cavity-Fractured Reservoir ......................................................... 376
Xiaolong Peng, Southwest Petroleum U.; Zhilin Qi, Sinopec Zhongyuan Oil Field; Baosheng Liang, SPE, U. of Texas; and Xuei Liu, Sinopec Northwest Co.

Use of New Rate-Integral Productivity Index in Interpretation of Underbalanced Drilling Data for Reservoir Characterization .................................. 383

Expandable Liner Hanger Resolves Sealing Problems and Improves Integrity in Liner Completion Scenarios ......................................................... 390
James Williford and Pete Smith, Halliburton Energy Services Inc.

Success of Hybrid Fracs in the Basin ........................................................................ 399
Juan Antonio Coronado, BJ Services Co.

Plunger Lift Application and Optimization in the San Juan North Basin—Our Journey .............................................................................. 404
Peter O. Oyewole, BP America Inc., and Divyakumar Garg, Ferguson Beauregard

Intelligent Prediction of Reservoir Fluid Viscosity ......................................................... 412
Yasin Hajizadeh, Islamic Azad U-Omidiyeh

Field Study Results Improve Squeeze-Cementing Success ......................................................... 419
Michael Cowan, Shell Intl. E&P

Investigation of Explosion Occurrence in Underbalanced Drilling ......................................................... 427
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparing Rigless Water-Cut Reduction Methods</td>
<td>435</td>
</tr>
<tr>
<td>Yan Xue, China U. of Petroleum, and Anping Yang, Applied Computer Engineering Inc.</td>
<td></td>
</tr>
<tr>
<td>Surface Reactive Fluid’s Effect on Shale</td>
<td>438</td>
</tr>
<tr>
<td>Bill Grieser, Halliburton; Bill Wheaton, Devon Energy Production Co., LP; Bill Magness, Williams Energy Services Co.; and Matt Blauch and Ray Loghry, Halliburton</td>
<td></td>
</tr>
<tr>
<td>Sealing Capacity of API Connections—Theoretical and Experimental Results</td>
<td>445</td>
</tr>
<tr>
<td>Marius Badicioiu, UPG Ploiesti, and Catalin Teodoriu, Texas A&amp;M U.</td>
<td></td>
</tr>
<tr>
<td>Gas Compressor Operations Performance Monitoring</td>
<td>453</td>
</tr>
<tr>
<td>Dan McCormick, Compression Consulting LLC</td>
<td></td>
</tr>
<tr>
<td>Control of Multiple Zone Intelligent Well To Meet Production-Optimization Requirements</td>
<td>460</td>
</tr>
<tr>
<td>Michael Konopczynski and Arashi Ajayi, WellDynamics Inc.</td>
<td></td>
</tr>
<tr>
<td>Inferring Interwell Connectivity From Well Bottomhole Pressure Fluctuations in Waterfloods</td>
<td>467</td>
</tr>
<tr>
<td>Anh Dinh and Djebbar Tiab, U. of Oklahoma</td>
<td></td>
</tr>
<tr>
<td>Effect of Surfactant on Volume and Pressure of Generated CO2 Gas</td>
<td>478</td>
</tr>
<tr>
<td>S.I. Bakhtiyarov, New Mexico Inst. of Mining and Technology; A.K. Shakhverdiyev, Inst. for Geology and Development of Fossil Fuels, Moscow; and G.M. Panakhov and E.M. Abbasov, Inst. of Mathematics and Mechanics, ANAS, Baku, Azerbaijan</td>
<td></td>
</tr>
<tr>
<td>Right Bit, Right Application, Right Time: Case Studies of Enhanced Bit Design Process</td>
<td>483</td>
</tr>
<tr>
<td>Sajad Yoosuf and Tom Goebel, Halliburton Security DBS</td>
<td></td>
</tr>
<tr>
<td>A Rigorous Analytical Model for Fluid Flow in Drainholes of Finite Conductivity Applied to Horizontal and Multilateral Wells</td>
<td>490</td>
</tr>
<tr>
<td>Boyun Guo, U. of Louisiana at Lafayette; Jinkui Zhou, Daqing Vocational College; and Ying Liu and Ali Ghalambor, U. of Louisiana at Lafayette</td>
<td></td>
</tr>
<tr>
<td>Uncertainty Assessment on Well-Performance Prediction for an Oil Producer Equipped With Selected Completions</td>
<td>499</td>
</tr>
<tr>
<td>Liang-Biao Ouyang, Chevron Energy Technology Co.</td>
<td></td>
</tr>
<tr>
<td>A Simple Productivity Equation for a Horizontal Well in Pseudosteady State in a Closed Anisotropic Box-Shaped Reservoir</td>
<td>508</td>
</tr>
<tr>
<td>Jing Lu and Djebbar Tiab, U. of Oklahoma</td>
<td></td>
</tr>
<tr>
<td>First Installation of an Openhole Expandable Sand-Screen Completion in the Iranian Oil Fields Leads to Operational Success and Production Enhancement—A Case History</td>
<td>518</td>
</tr>
<tr>
<td>A. Hooshmandkoochi and F. Ghorbani, Natl. Iranian Oil Co.</td>
<td></td>
</tr>
<tr>
<td>Microbial Enhanced-Oil-Recovery Technologies: A Review of the Past, Present, and Future</td>
<td>524</td>
</tr>
<tr>
<td>Saikrishna Maudgalya, Anadarko Petroleum Corp., and Roy M. Knapp and Michael J. Mclnerney, U. of Oklahoma, Norman</td>
<td></td>
</tr>
<tr>
<td>Prediction of Slurry Permeability, k, Using Static Gel Strength (SGS), Fluid Loss Value, and Particle Size Distribution</td>
<td>535</td>
</tr>
<tr>
<td>Y. Bahramian and A. Movahedlinia, Tehran Polytechnic, and M.R. Rasaei, U. of Tehran</td>
<td></td>
</tr>
<tr>
<td>Case History: Acid Stimulation Devonian Horizontal Wells</td>
<td>544</td>
</tr>
<tr>
<td>Michael Swain, Kim Nordstog, and Howard Miller, Cimarex Energy, Bob Weaver, and Arthur S. Metcalf, BJ Services Co.</td>
<td></td>
</tr>
<tr>
<td>Case History: Acid Fracturing Deep, Hot Ellenburger</td>
<td>550</td>
</tr>
<tr>
<td>Michael Swain, Kim Nordstog, and Howard Miller, Cimarex Energy; James Fallon, Willo Oil &amp; Gas Exploration; and Bob Weaver, and Arthur S. Metcalf, BJ Services Co.</td>
<td></td>
</tr>
<tr>
<td>New Type Curves for the Analysis of Pressure Transient Data Dominated by Skin and Wellbore Storage—Non-Newtonian Fluid</td>
<td>558</td>
</tr>
<tr>
<td>Alpheus O. Igbokeoyi and Djebbar Tiab, U. of Oklahoma</td>
<td></td>
</tr>
</tbody>
</table>
Finite Element Studies of Near-Wellbore Region During Cementing Operations: Part I
K.E. Gray, E. Podnos, and E. Becker, U. of Texas at Austin

Subsidence Due to Fluid Withdrawal in Fractured Reservoirs
Vahid Atashbari and Mohabbat Ahmadi, Pioneer Advisors of Energy

An Approach To Apply the Gas in the Annulus To Assist Pumping Oil in High-GOR Wells
Liu Yonghui and Li Yingchuan Southwest Petroleum U.; Li Xiaqiu, Zhongyuan Oilfield, Sinopec; and Tang Guilian, Southwest Oil & Gas Co. of PetroChina

A Review on Microbial Enhanced Oil Recovery With Special Reference to Marginal/Uneconomical Reserves
S. Zahid, H.A. Khan, and M.K. Zahoor, U. of Engineering & Technology, Lahore, Pakistan

Development of Unconventional Gas Resources: Stimulation Perspective
S. Zahid, A.A. Bhatti, H.A. Khan, and T. Ahmad, U. of Engineering & Technology, Lahore, Pakistan

The Important Second Fracture and Its Optimal Placement for Maximizing Production
Jim B. Surjaatmadja, Halliburton

Rigless Tubing Repair Using Permanent and Retrievable Patches at Prudhoe Bay, Alaska—Continued Analysis and Current Applications

AUTHOR INDEX