SOCIETY OF PETROLEUM ENGINEERS

SPE European Formation Damage Conference 2005

Held May 25 – 27, 2005 Scheveningen, The Netherlands

Printed from CD-ROM with permission by:

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

KUDP <; 9: /3/82645/763/:

Copyright and Use Restrictions Copyright 2005, Society of Petroleum Engineers

Material included in this Proceedings is copyright protected. Electronic reproduction, distribution, or storage of any part of an SPE-copyrighted paper for commercial purposes without the written consent of the Society of Petroleum Engineers is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of where and by whom the paper was presented. For photocopying beyond the above permissions, libraries and other users dealing with the Copyright Clearance Center (CCC) Transactional Reporting Service must pay a base fee of \$3 per copyrighted article plus \$0.25 per page to CCC, 222 Rosewood Drive, Danvers, Massachusetts 01923 U.S.A. For other permissions, contact Librarian, SPE, 222 Palisades Creek Drive, Richardson, Texas 75080-2040 U.S.A.

Use of SPE member or author contact information included on this CD for commercial purposes or reproduction of that information in whole or in part, in any form or medium, is strictly prohibited and subject to legal action. Contact SPE to inquire about rental of mailing lists.

This CD of the SPE European Formation Damage Conference was produced by SPE. This product contains Adobe® Reader® Software. Permission to print and distribute content from this product must be obtained from SPE. Duplication of replication products is absolutely prohibited without written permission from SPE and Adobe. Adobe, the Adobe logo, and Reader are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Material on the CD was reproduced from original papers and/or electronic files provided by the authors. Some discrepancies are inevitable. Please advise SPE of errors so corrections can be made to the electronic versions of the article. Send corrections by e-mail to pdf@spe.org or mail to the SPE Americas Office, attention Technical Paper Administrator.

USE OF MATERIALS LIMITATIONS

All materials contained in these *Proceedings* are copyrighted to the Society of Petroleum Engineers. Papers on this CD are for your personal non-commercial use and may not be copied, distributed electronically or in print, or reproduced in whole or in part, in any form without the expressed written permission of the Society of Petroleum Engineers.

2005 SPE European Formation Damage Conference

25–27 May 2005 • Scheveningen, The Netherlands

TABLE OF CONTENTS

- SPE 93638 Dynamic Underbalanced Perforating on a Mature North Sea Field A.J. Martin, Schlumberger, and D. Clark and G. Stirton, CNR Intl.
- 7 SPE 93805 Stimulation of High-Temperature Sandstone Formations From West Africa With Chelating Agent-Based Fluids
 S. Ali, E. Ermel, and J. Clarke, ChevronTexaco, and M.J. Fuller, Z. Xiao, and B. Malone, Schlumberger
- SPE 93886 Well-History-Based Prediction of Injectivity Decline During Seawater Flooding

 P. Bedrikovetsky, M.J. da Silva, and D.R. Fonseca, North Fluminense State U., and M.F. da Silva,

P. Bedrikovetsky, M.J. da Silva, and D.R. Fonseca, North Fluminense State U., and M.F. da Silva A.G. Siqueira, A.L.S. de Souza, and C. Furtado, Petrobras

- SPE 93892 Direct Monitoring of the Performance of Scale Control Programs Across the Produced Water Life Cycle Via Suspended Solids Analysis M.M. Jordan, Nalco; J. Buckman, Heriot-Watt U.; and C.J. Johnston, Nalco
- 46 SPE 94465 Continuous Improvement in Fracturing Fluid Design in Gas Fields of the Italian Adriatic Sea Region
 S. Cobianco, EniTecnologie; E. Pitoni and G. Ripa, Eni E&P; and D. Perez, M. Patey, and J. Jeanpert, Schlumberger
- SPE 94483 Effect of Residual Oil on the Particle Deposition Profile in Deep-Bed Filtration During Produced Water Reinjection

 M.A.J. Ali and P.K. Currie, U. of Delft, and M.J. Salman, Kuwait Inst. for Scientific Research
- SPE 94485 Optimizing Matrix Acid Treatments in a Multilayered Reservoir in Russia by Applying Different Diversion Techniques R. Pongratz, R. Kontarev, and B. Robertson, Halliburton
- SPE 94506 Small Propped Fracture to Remove Near Wellbore Formation Damage: An Example From the Veslefrikk Field in the North Sea *T. Haugland, E. Berg, and T. Tjomsland, Statoil*
- 94 SPE 94510 Mineralogy Driven Scale Inhibitor Squeeze Designs R. Gdanski and G.P. Funkhouser, Halliburton
- SPE 94511 Production Enhancement From Sand Management Philosophy: A Case Study From Statfjord and Gullfaks

 J. Andrews, H. Kjørholt, and H. Jøranson, Statoil

114 SPE 94518 Development and Field Application of a Shallow Perforation Shutoff System for HP/HT Oil Wells

J. van Eijden and F. Arkesteijn, Shell Intl. Exploration & Production; D. van Batenburg, Halliburton; and J. van Vliet, Al Furat Petroleum Co.

- SPE 94527 Prediction of Skin in Openhole Sand Control Completions
 C. Jones and M. Tollefsen, Weatherford, and J.M. Somerville and R. Hutcheon, Heriot-Watt U.
- SPE 94551 Mud-Induced Formation Damage in Carbonate Reservoirs: Consequences on Productivity of Open-Hole Horizontal Wells A. Al-Taq, Saudi Aramco, and B. Bazin, D. Ding, and P. Egermann, Inst. Français du Pétrole
- SPE 94558 Investigation of Flow-Back Properties of Various Drilling and Completion Fluids Through Production Screens

 K. Taugbøl and G. Svanes, M-I SWACO; K. Svanes and T.H. Omland, Statoil; and E. Alterås and A.M. Mathisen, Norsk Hydro
- 150 SPE 94559 Investigation of Reactive Transport Phenomena for Modification of Two-Phase Flow Using NMR

 H.J. Castelijns, Delft U. of Technology and Eindhoven U. of Technology; L. Pel and H.P. Huinink, Eindhoven U. of Technology; and P.L.J. Zitha, Delft U. of Technology
- SPE 94560 Increase of Accuracy in Determination of Skin-Effect and Perm Thickness Product For Low Permeability Reservoirs

 R.N. Diyashev, JSC Tatneftegeophysica and V.A. Iktissanov, Inst. TatNIPIneft
- SPE 94566 An Experimental and Modeling Investigation of Acid-Created Channels in Sandstone
 T. Xie and C. Li, U. of Texas at Austin; M. Pournik, D. Zhu, and A.D. Hill, Texas A&M U.; and C. DeVine, BJ Services
- 175 SPE 94568 Effect of Natural Fractures on Hydraulic Fracture Propagation N. Potluri, D. Zhu, and A.D. Hill, Texas A&M U.
- **181** SPE 94596 Recommended Practice for Overbalanced Perforating in Long Horizontal Wells

F.F. Chang, Schlumberger; A.M. Mathisen, Norsk Hydro; N. Kågeson-Loe, BP; I.C. Walton, Schlumberger; G. Svane, M-I Norge; and R.E. Midtbø, I. Bakken, J. Rykkje, and O. Nedrebø, Norsk Hydro

193 SPE 94603 Novel CO₂-Emulsified Viscoelastic Surfactant Fracturing Fluid System

Y. Chen, T.L. Pope, and J.C. Lee, Schlumberger

- 199 SPE 94604 One-Step Acid Removal of an Invert Emulsion L. Quintero, T. Jones, and D.E. Clark, Baker Hughes Drilling Fluids
- 208 SPE 94606 A Mechanistic Model for Formation Damage and Fracture Propagation During Water Injection

 A.S. Abou-Sayed, K.S. Zaki, G.G. Wang, and M.D. Sarfare, Advantek Intl.

- 216 SPE 94622 Maximizing Inflow Performance in Soft Sand Completions Using New One-Trip Sand Control Liner Completion Technology *P. McElfresh, C. Williams, and G. Garfield, Baker Oil Tools*
- SPE 94633 Potential of Different Polyamino Carboxylic Acids as Barium and Strontium Sulfate Dissolvers

 I. Lakatos and J. Lakatos-Szabó, U. of Miskolc
- **229** SPE 94634 New Experimental and Modelling Approach for the Quantification of Internal Filtration

F.A.H. Al-Abduwani, Delft U. of Technology; G. Hime and A. Alvarez, Instituto Nacional de Matemática Pura e Aplicada; and R. Farajzadeh, Delft U. of Technology and Natl. Iranian Oil Co.

240 SPE 94635 External Filter Cake Erosion: Mathematical Model and Experimental Study

F.A.H. Al-Abduwani, Delft U. of Technology; P. Bedrikovetsky, State North Fluminense U. LENEP/UENF; and R. Farajzadeh, W.M.G.T. van den Broek, and P.K. Currie, Delft U. of Technology

254 SPE 94643 Analysis of the Performance of Hydraulic Fracturing Treatments and Quantum Design Improvements

A.S. Demarchos, MJE Consultants; M.J. Economides, U. of Houston; and I. Diyashev and V. A. Svaykin, Sibneft

- **261** SPE 94644 A General Approach To Well Evaluation *I.R. Diyashev, Sibneft, and M.J. Economides, U. of Houston*
- 272 SPE 94649 Fracture Face Damage—It Matters
 R. Gdanski, J. Weaver, B. Slabaugh, H. Walters, and M. Parker, Halliburton
- 282 SPE 94651 A Comparison of the Performance of Recent Sand Control Completions in the Mokoko Abana Field Offshore Cameroon D. Mason, Shell Intl. Exploration and Production; M.J. Ramos and C.M. Pena, Pecten Cameroon Co.; and J. Cameron and C. Jones, Weatherford Intl.
- 292 SPE 94660 Investigation of a Novel Chemical for Bullhead Water Shutoff Treatments

K. Elewaut, Delft U. of Technology; A. Stavland, RF Rogaland; A. Zaitoun, Inst. Français du Pétrole; Z. Krilov, INA; and P.L.J. Zitha, Delft U. of Technology

- **298** SPE 94666 Sustaining Fracture Conductivity *J.D. Weaver, P.D. Nguyen, M.A. Parker, and D. van Batenburg, Halliburton*
- 308 SPE 94686 Development of a Nanocomposite Gel for Lost Circulation Treatment E. Lécolier, B. Herzhaft, L. Rousseau, and L. Néau, Inst. Français du Pétrole, and B. Quillien and J. Kieffer, SNF-Floerger

- 317 SPE 94687 TNK-BP Wellwork Performance Management *M. Postnikov, TNK-BP*
- 325 SPE 94695 Field Validation of Acidizing Wormhole Models G. Glasbergen, D. van Batenburg, M. van Domelen, and R. Gdanski, Halliburton
- 336 SPE 94702 Enzyme Breakers for Chemically Modified Starches E. Battistel, D. Bianchi, M. Fornaroli, G. Guglielmetti, P. Europa, and S. Cobianco, EniTecnologie
- 346 SPE 94706 First Implementation of Hydrajet Fracture Acidizing in Deepwater Offshore Brazil Fields V.F. Rodrigues, L.F. Neumann, M.A. Rosolen, P.D. Fernandes, and C. Lima, Petróleo Brasileiro,
- 362 SPE 94712 OBM's Filtrate Damaging Effect on Gas Wells C.N. Emiliani, G. Ripa, and M. Sportelli, Eni E&P, and S. Cobianco and L. Del Gaudio, EniTecnologie

and J.B. Surjaatmadja, C.M. Gonzalez, and F. Carneiro, Halliburton

- 369 SPE 94715 Making Sense of Return Permeability Data Measured in the Laboratory

 L. Han, A. Lohne, B. Stevenson, and A. Stavland, RF-Rogaland Research
- 381 SPE 94718 Calculation of Productivity of a Gas-Condensate Well: Application of Skin With Rate Dependent Pseudopressure

 M. Jamiolahmady, A. Danesh, A. Rezaei, R. Ataei, and M. Sohrabi, Heriot-Watt U.
- 391 SPE 94726 Active Filter-Cake Technology—Eliminating the Need for Post-Completion Cleanup
 R. Ravitz, M-I SWACO; M. McCarter, THUMS Long Beach Co.; A. Taglieri, Occidental
 Petroleum; G. Colazas, THUMS Long Beach Co.; and E. Montes and S. Rizkalla, M-I SWACO
- **401** SPE 94727 Analysis of Production Enhancement Related to Optimization of Propped Hydraulic Fracturing in Gazprom's Yamburskoe Arctic Gas Condensate Field, Russia

 K.K. Butula, J. Maniere, A. Shandrygin, and D. Rudenko, Schlumberger, and I.A. Zynchenko,
- 417 SPE 94757 Delivering BP North Sea's Longest OHGP Completion in the Harsh Environment Deepwater West of Shetlands

 D. White, A. Wilson, and A. Roy, BP, and S. Stewart, R. Woudwijk, and A. Nadeem, Baker Oil
- **429** SPE 94763 Forensic Reservoir Characterisation Enabled With Underbalanced Drilling

M.S. Culen and D.R. Killip, Precision Drilling Services & Co.

Gazprom

Tools

432 SPE 94764 Determination of Gas Trapping With Foam Using X-Ray CT and Effluent Analysis

Q.P. Nguyen, Delft U. of Technology and U. of Texas at Austin; W.R. Rossen, U. of Texas at Austin; and P.L.J. Zitha and P.K. Currie, Delft U. of Technology

- SPE 94790 A Review of Matrix Acidizing Sandstones in Western Siberia, Russia K. O'Driscoll, S. Stolyarov, and L. Kalfayan, BJ Services Co.
- **466** SPE 94799 Successful Application of a Unique and Low Friction Frac-Pack Fluid in Gulf of Mexico Deep Wells

B.R. Gadiyar, R.H. Morales, and E. Nelson, Schlumberger; K. Barton, Shell; D. Fischer, Remington; and D. Sorrells, Schlumberger

473 SPE 94802 Pulse-Rotating Jet System Acidizing in a Campos Basin Deepwater Horizontal Gravel Packed Injection Well

A.Z.I. Pereira, A. Calderon, C.M. Chagas, C. de Camargo, and E.P. da Motta, Fabricio; A.A. de Miranda and J.P.F. de Santana, Petrobras; and M. Acosta, O.G. Zacarias, R.L. Farias, and V. Almeida, BJ Services

483 SPE 95001 A New Chemical Treatment to Remove Multiple Damage in a Water Supply Well

H.A. Nasr-El-Din, A.M. Al-Mohammad, and M.A. Al-Hajri, Saudi Aramco, and J.B. Chesson, BJ Services

- **492** SPE 95004 Tube Pickling Procedures: Case Studies S.H. Al-Mutairi and H.A. Nasr-El-Din, Saudi Aramco
- 504 SPE 95006 Successful Application of Foamed Viscoelastic Surfactant-Based Acid S.K. Mohammed and H.A. Nasr-El-Din, Saudi Aramco, and M.M. Erbil, Schlumberger
- 511 SPE 95010 Chemical Water Shutoff Interventions in the Tunu Gas Field: Optimisation of the Treatment Fluids, Well Interventions, and Operational Challenges

P. Chenevière, Total; P. Falxa, Total Indonesia; J. Alfenore, Total; D. Poirault, Total Indonesia; and P. Enkababian and K.S. Chan, Schlumberger

- 523 SPE 95019 Hydraulic Frac Stimulations in a Libyan Oil Field—A Case History U. Droegemueller, Wintershall AG Germany, and B. Leonhardt, Wintershall Libya
- 538 SPE 95021 A Simulator For Produced Water Reinjection in Thermally Fractured Wells

J.L. Detienne, Total; J. Ochi, Consultant; and P. Rivet, Total

549 SPE 95022 Scale Inhibitor Application in Injection Wells to Protect Against Damage to Production Wells: When Does It Work?

E.J. Mackay, Heriot-Watt U.

- SPE 95024 Getting a Clear Picture—Individual Zone Testing of the Khuff Reservoir Through First Application of a Zonal Isolation Completion and Nondamaging Drilling and Completion Fluids E. Sorgard, Shell; D. Knox and C. Svoboda, M-I SWACO; S. Mason, Schlumberger; and B. McNeil, Shell
- 571 SPE 95025 Characterization of the Invasion Profile and Its Components Due to Drilling Fluid Mudcake Filtration, Using the Synchrotron Light X-Ray Fluorescence

J.C.Q. Neto and J.L.B. Ribeiro, Petrobras; R.T. Lopes, COPPE/UFRJ; M.J. Anjos, IF/UERJ; and L.C.B. Bianco and M.V. Coelho, Petrobras