Society of Petroleum Engineers

Conference and Exhibition on Coiled Tubing and Well Intervention 2007

March 20 - 21, 2007 Houston, Texas, USA

Printed from e-media with permission by:

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

ISBN: 978-1-60423-794-8

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

Copyright and Use Restrictions Copyright 2007, 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 2007 SPE Production and Operations Symposium 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.



Society of Petroleum Engineers

Conference and Exhibition on Coiled Tubing and Well Intervention 2007

TABLE OF CONTENTS

Near a Kilometer of Perforating Guns, in a 7½-km, Extended-Reach Well— Coiled Tubing Shows Its Mettle in New Zealand	1
P. Bartholomew, Shell Todd Oil Services Ltd.; L. Portman and R. Frost, BJ Services; P. Nunn and P. Vause, Vause Wireline; D. Edmondson, L. Andrich, and T. LaGrange, Owen Oil Tools	
Coiled-Tubing Perforation and Zonal Isolation in Harsh Wellbore Conditions	8
Striving the Coil Tubing Limit Intervention on Snake "Long Horizontal" Complex Gas Well: Successful Perforation and Completion	16
Coiled-Tubing Gyro MWD Improves Kickoff Direction Accuracy for Cased-Hole Re-entry Drilling	24
Recent HP/HT Coiled-Tubing Intervention and Perforating Operations on the Jade	
Field	30
Alan Turner, William Gordon, and Iain Nicol, Halliburton, and Steve Cromar, ConocoPhillips Co.	
Semistiff Carbon-Fiber Rod Pushed Into Live Wells for Reservoir Performance	
Monitoring and Leakage Detection	42
Rigless Installation of Safety Valves To Implement a Well-Integrity Campaign and	
Return Wells to Production Folorunso Afolabi, Shell Petroleum Development Co. of Nigeria Ltd.; Rodger Lacy, Robert Asher, and Bobby Butler, Weatherford Intl.	50
World's First Combined Acid Stimulation of Horizontal Openhole Gravel-Pack Application of Coiled-Tubing, Dynamically Positioned Vessel, and Floating	5 7
Production, Storage, and Offloading, Deepwater Offshore Brazil	57
Effective Application of an Innovative Conveyance-Risk Management Methodology To Reduce Well-Intervention Cost and Risks in Long/Deep/Tortuous	
Wells	72
Fiber-Optic-Enabled Coiled-Tubing Operations on Alaska's North Slope	87
P.D. Rangel and I. Sorman, Schlumberger, and C.G. Blount and N. Woods, ConocoPhillips	
Use of 3D Visualization Software for Multifinger Caliper Analysis at Prudhoe Bay, Alaska	05
J.Y. Julian, D.A. Cismoski, and R.O. Younger, BP Inc., J.P. Burton and M.W. Lawrence, ProActive Diagnostic Service Inc.	95
16Cr Coiled-Tubing Field Trial at Prudhoe Bay, Alaska	102

Pipeline Flow Capability Restoration Using Coiled-Tubing and Rotating-Jetting Technology	3
An E-Line Deployed Retrofit Completion With Temporary Automatic Water Shutoff in a Subsea U.K. North Sea Well Using an Intervention Vessel	3
Economic Recovery of Gulf of Mexico Shelf Reserves Using an Integrated Approach to Well Services	О
Repeatedly Increased Efficiency and Success Rate From a New Solids-Cleanout Process Using Coiled Tubing: A Review of Recent Achievements From Over 100 Operations	4
M. Sach and J. Li, BJ Services Co.	
Ultradeep Extended-Reach Stimulations)
Coiled-Tubing-Deployed ESP in 5½-in. Casing: Challenges in Designing Down	3
Successful Application of Underbalanced Coiled-Tubing Drilling in Horizontal Short-Radius Re-entry Well in Hassi Messaoud, Algeria	1
Vibration and Rotation Considerations in Extending Coiled-Tubing Reach	C
Challenges in Working Over-Severely Corroded Water Injectors for PWRI Application	9
New Cleanup System for Gravel-Pack Completions: A Synergy of a Unique Acid System and Special Rotating Jetting Tool	Э
Enhanced Solids-Removal Techniques From Ultralow-Pressure Wells Using Concentric Coiled Tubing Vacuum Technology	8
Phil Rafferty, BJ Services Co.; Jim Ennis, ConocoPhillips Alaska Inc.; and Jason Skufca and Steven Craig, BJ Services Co.	•
Sour-Well Serviceability of Higher-Strength Coiled Tubing	3
Liquid Unloading of Depleted Gas Wells in the North Sea and Continental Europe, Using Coiled Tubing, Jointed Pipe Velocity/Insert Strings, and Microstrings	2
Abrasive Perforating via Coiled Tubing Revisited	9
Coiled-Tubing-Deployed Fracturing Service Yields Increase in Completion Efficiency	3
Oriented Perforating Using Abrasive Fluids Through Coiled Tubing	3

Case Histories of Barium Sulfate Scale Removal in Offshore Wells, Brazil, Using aNew Engineered Combination of Coiled-Tubing Tools	240
Z. Guimaraes, A.B Franca, and L.H Duque, BJ Services Co., and R.B De Souza, M. Porto, D. Neves, and C. Peixoto, Petrobras	
Measuring CT and Slickline Fatigue Life Reduction Due to Corrosion	248
A Successful Dual-Casing Exit Campaign Brian Cruickshank, Charles Grigor, Lewis Parker, and Gary Pape, Smith Intl. Inc.	254
Two-Phase Fluid Flow Through Fully Eccentric Horizontal Annuli: A Mechanistic Approach	260
C. Omurlu Metin and M.E. Ozbayoglu, Middle East Technical U.	
Successful Implementation of Coiled-Tubing Acid Tunneling Gives Operator a Viable Alternative to Conventional Stimulation Techniques in Carbonate Reservoirs	267
Jose Daniel Diaz, BJ Services; Victor Espina, Melvi Guerrero, and Omar Colmenares, PDVSA; and Paul Moss, BJ Services	207
Novel Coiled-Tubing Spoolable Connector Deployment in the Norwegian Sector of the North Sea	276
S.O. Bolarinwa, M. McKee, F.F. Espinosa, J. Cochran, and O. Lien, Schlumberger, and J. Toften, Statoil ASA	
Coiled-Tubing Milling of an Incoloy Alloy 925 Safety Valve Flapper in the North Sea	282
R.A. Farquhar, F.A. Rattray, and A. Annandale, Marathon Oil U.K., Ltd.; A. Reid, Welltonic Ltd.; and S. Glegg, B.J. Services Co. U.K. Ltd.	202
Delivering Value for Tracking Coiled-Tubing Failure Statistics	294
Corrosion Inhibition for High-Temperature and High-H2S Coiled-Tubing Applications	302
A.S. Ali Al-Habsi, S. Mokhtar, and A. Lahmadi, Schlumberger	
Improving Reliability and Consistency in BHA Configuration Through the Use of an Expert Tool-Selection System	307
Robert Greenaway and Rex Burgos, Lambert Dilling, and Cabe Vreeland, Steve Bruce, and Loren Hauglund, Schlumberger	
Water-Shutoff Treatment in Wells With Single-String Multizone Completion	242
Intervals Victor E. Uadiale, Schlumberger; Otaru G.Oghie, Shell E&P, U.K.; and Vincent O. Nwabueze, Shell E&P, Nigeria	313
Opportunities for Rigless CT Intervention for Marginal Fields in Offshore Nigeria Victor E. Uadiale and Daniel Asedegbega, Schlumberger	322
Comparison of Computation Fluid Dynamics of Slurry Flow in Coiled Tubing to Field Data	338
Ivan Blanco, Michael Bailey, and Randy Rosine, Halliburton	
Coiled-Tubing Fracturing on Slant-Well Operations D.A. Pipchuk, M. Henriksen, M. Day, K. Boyko, Schlumberger, and D. Scott, Encana Corp.	344
Metal-to-Metal Sealing Technology: Bridging the Gap Between Conventional and High-Expansion Zonal Isolation Applications	351
Garry Garfield and Gordon Mackenzie, Baker Oil Tools	
Coiled-Tubing-Conveyed Perforating for High-Pressure/High-Temperature	0.57
Environment in Mexico Marine Nestor Molero, Sergio Garcia, and Eduardo Zavala, Schlumberger, and Javier Cordova and Ulises Solis, Pemex	357

Coiled Tubing Becomes the Key Enabler for Successful Multilateral Well Development Campaign Offshore Brazil	365
S. Trummer, D. Silva, V. Cano, and M. Guzman, Schlumberger, and N. Siqueira, C. Peixoto, and V. Nazareth, Petrobras	
Fatigue Life of Coiled Tubing With External Mechanical Damage	379
Drilling With a Positive-Displacement Motor and a Rotary-Steerable System on 3½-in. Coiled Tubing in the San Juan Basin	395
Application of Lateral Entry Guidance System (LEGS) Technology in Western Kazakhstan Oil Fields	404
A Novel Coiled-Tubing Wall Thickness and Ovality Measuring Tool for Field Use Robert Standen and Don Pike, BJ Services Co.	409
Enabling Workover Applications With Coiled-Tubing-Deployed Inflatable Packers J. Carrillo, A. Paz, E. Franco, and R. Nájera, Schlumberger, and J. Perez, J. Cabrera, and A. Zamarron, Pemex	415
Toolstring Impact Sensors Stuart McLaughlin and Alan McLauchlan, Impact Guidance Systems Inc.	427
First Subrigfloor HWO Intervention System for a Floating Vessel	434
4th-Generation Coiled-Tubing Manufacturing Technology	439
An E-Line Solution to Sand and Scale Remediation in High-Angle Wells	442
A Process Delivery Template for an Underbalanced Coiled-Tubing-Drilling Project From Concept To Execution	447

AUTHOR INDEX