

SPE/IADC 105395

Casing Drilling Step Improvement: PDC Successfully Drills Out Casing Bit and Finishes Hole Section at Lowest Cost. I. Johnstone, A. Chomley, G. Cernev, M. Hoq, G. Atherton, S.S. Cornel and M. Jacobs, Hughes Christensen.

In Cooper Basin, onshore Australia, the need to reduce drilling costs is pushing casing while drilling technology forward. The operator was having difficulties drilling formations with weak matrix strengths, loss circulation zones and tight pore pressure/fracture gradient windows. A casing bit manufactured from a specialized steel alloy was recommended that allows technicians to braze PDC cutters directly to the one piece bit, ensuring the cutting structure is capable of efficiently drilling new formation and reaming existing hole while drilling casing in place. A new style drillout PDC was used to drill through the casing bit and continue drilling formation without tripping for a new bit. The authors will make cost comparisons with offset wells drilled with conventional drilling systems and focus on lessons learned.

SPE/IADC 105432

Connection Qualification for Casing Drilling Application. Q. Lu and D. Hannahs, Grant Prideco; J. Wu, Chevron.

As no commonly accepted industry standard exists in qualifying connections for casing drilling applications, a big question for the industry is how to determine reasonable and practical methods to measure connection performance for casing drilling applications. By applying ISO 13679 (regular casing connection test specification) worst case tolerance strategy, this paper presents test results on connections tested under the dynamic loading conditions. This paper illustrates the benefits, savings and limitations achieved with this testing program. Performance parameters of casing drilling connections can be accurately defined by testing with worst case sealability and fatigue life tolerance.

Technical Session 17: Completions

SPE/IADC 105556

Qualifying a New Expandable Reservoir Completion System. P.C. Wood and D. Duhrkopf, BP; A. Green, Weatherford.

In 2003 BP and Weatherford formed a collaboration to develop a new Expandable Reservoir Completion (ERC) system that would be run and expanded in a single trip to ensure efficient installation. From 2004 to 2007, 7 installations were completed to test the functionality of the completion equipment and associated expansion tools. This paper will describe the development of the ERC system and review some of the most significant lessons learned.

SPE/IADC 105542

Lessons Learned on Sand-Control Failure and Subsequent Workover at Magnolia Deepwater Development. G. Colwart, R.C. Burton, L.F. Eaton and R.M. Hodge, ConocoPhillips; K. Blake, Schlumberger.

In the Magnolia field, premium screens with alternate path tubes in conjunction with cased hole frac packs were used to complete the wells. The third well, A1ST1BP1, was completed using the same techniques as were successfully used on the first two wells. Completion failed during initial unloading. The well was worked over, and the tubing with 8 control lines and premium sand control screen with alternate path tubes were fished from the tight



SPE/IADC 105854: A metal-to-metal sealing technology uses expanding metal to form a high-integrity pressure seal.

clearances in the well. The retrieved screens had collapsed around the perforated base pipe. The well was re-perforated, new screens run and a second frac pack pumped. When laying down the washpipe after the second frac pack, erosion marks indicated an apparent second screen failure. Collapse testing revealed the screen lost sand control at less than 1,000 psi. The collapse rating stated by the manufacturer was greater than 7,000 psi. The erosion tests demonstrated that inflow from supercharged reservoirs into the wellbore could erode hole(s) in the premium screen. Revised procedures were used in 6 subsequent frac packs without any additional failures and zero to negative completion skins.

This paper will discuss the failure modes of the 2 frac pack/premium screen sand failures, work-over planning and execution, procedural revisions developed to successfully frac pack the subsequent Magnolia reservoirs.

SPE/IADC 105854

Recent Metal-to-Metal Sealing Technology for Zonal Isolation Applications Demonstrates Potential for Use in Hostile HPHT Environments. G. Garfield and G. Mackenzie, Baker Oil Tools.

Metal-to-metal sealing technology is a high-expansion seal that uses expanding metal to form a high-integrity pressure seal. Recent applications of the seal and the latest lab testing have suggested the prospective of the technology for products in the HPHT arena. The technology could make well suspensions and intervention possible in hostile HPHT wells that were previously deemed inoperable by the complete removal of elastomers from the design. Case studies in terms of design, testing, and implementation will recognize the alignment to the increased demands of HPHT applications.

SPE/IADC 105736

Overcoming the Loss of a Primary Barrier in an HPHT Well — Investigation and Solution. A. Humphreys, Total; R. Ross, Baker Oil Tools.

In 2005, a completed HPHT well suffered the loss of a primary barrier resulting in a hydrocarbon leak from the production column into the production

annulus. Following a complex well kill operation, a full-scale reproduction of the downhole failure was carried out in a test facility at absolute BHT (200c), BHP (19,000 psi). This programme concluded that the properties of Aflas at high temperature and pressure, when allied with very limited deformation or wear of the casing (less than 1 mm) could lead to a slow deterioration and ultimate failure to contain differential pressure. The manufacturer then undertook a programme to develop packer systems capable of accommodating casing irregularity in this severe HPHT environment. A packer system was developed and successfully tested in casing with significant wear patterns at 15K psi differential and 230°C. This redesigned packer has subsequently been deployed in an HPHT well.

SPE/IADC 105715

Drilling and Completing Intelligent Multilateral MRC Wells in Haradh Inc-3. F. Al-Bani and A. Shah Baim, Saudi Aramco; S. Jacob, WellDynamics.

The Haradh Inc 3 development has added significant volumes to Saudi Aramco's daily production capacity. The development has 73 wells, including 32 producers — 28 of them are intelligent multilateral MRC wells. The multilateral systems improve the reservoir contact while reducing the drawdown on the reservoir. The intelligent completion system allows the inflow from each lateral to be controlled from the surface. The combination of the multilateral and intelligent completion system is expected to enhance field recovery by preventing/delaying water coning and improving sweep efficiency. Haradh Inc 3 may be considered as an industry milestone where the field development is focused on the "Smart Multilateral Systems." The paper will discuss equipment selection, well placement and drilling/completion practices of the intelligent wells.

SPE/IADC 105443

Are Swelling Elastomer Technology, Pre-perforated Liner and Intelligent Well Technology Suitable Alternatives to Conventional Completion Architecture? G.P. Hertfelder and K. Koerner, Plains E&P; A. Wilkins, Easywell; L. Izquierdo, Schlumberger.

An independent operator offshore California integrated swelling elastomer technology and pre-perforated liners with triple zone intelligent well completions for an extended-reach drilling campaign in the Rocky Point field. Three deployments have been successfully installed in this field, and each has provided successful zonal isolation without conventional cementing and perforating methods. This paper focuses on the operator's innovative use of advanced completion technologies to lower developmental cost and optimize production rates. Also discussed is the safety provided by the intelligent well completion systems. Three field deployments using swelling elastomer, pre perforated liner and intelligent completion technologies will be discussed along with the initial design, installation objectives, safety attributes, field installation, and performance results.

SPE/IADC 105489

World's First Annular Safety Valve for Dual Concentric Water Injection. K.A. Pearce and H.G. Skorve, Hibernia Management and Development; M. Grini, ExxonMobil.

The Hibernia Gravity Based Structure (GBS) platform has 64 slots for well construction, and only a limited number of well slots remain. Since production began in 1997, it has become apparent that more than 64 wells will be required to adequately develop the resources. To optimize the use of remaining slots, a solution was developed to drill a well through the upper Ben Nevis Avalon (BNA) reservoir and into the Hibernia reservoir. This well is the first Hibernia dual water injection well. To

realize this design concept, the world's first annular safety valve for dual concentric water injection was designed, manufactured, fully tested, and qualified. The WIDD1_AWIG1 well was successfully drilled and completed, allowing dual injection as envisioned in the original well proposal.

Technical Session 18: Deepwater Drilling II

SPE/IADC 105661

Development of a Subsea TTRD Capability West of Shetland. R. Johansen, BP; A. MacLeod, LEADING Edge Advantage.

This paper describes BP's project to develop a subsea through tubing rotary drilling (TTRD) capability in the Schiehallion and Foinaven fields west of Shetland by 2009. The hostile deepwaters were a significant challenge to the application of TTRD in subsea wells. This paper will outline the work carried out during the Front End Engineering Design (FEED) phase, and key conclusions from FEED are explained.

SPE/IADC 105198

Real-Time Digital Interpretation of Subsea Blowout Preventer Tests. W.J. Winters and T.A. Burns, BP; R.B. Livesay, Hecate Software.

A computer-based method expedites interpretation of pressure data during subsea BOP tests. Individual tests can require more than 1 hr of shut-in time, and a complete series of subsea BOP tests may comprise at least 12 individual tests. The digital method employs computer software to produce an accurate model of the pressure behavior relatively early in



SPE/IADC 104747: Three major projects have been performed with a new rigless intervention system.

each test. The model can thus predict if future pressures will stabilize at an acceptable level. With regulatory approval and a reliable method to forecast pressure, the duration of subsea BOP tests can be significantly reduced. If implemented, the new method would be able to save hours of valuable critical-path rig time. Working in concert with regulatory authorities to gain endorsement of this method is integral to the project.

SPE/IADC 105035

Design, Development and Qualification of a Threaded and Coupled Connector for a Sour Service Compatible Completion and Workover Riser. G. Craig, G. Bailey and R. Ethridge, Grant Prideco; W. Byrne, Baker Oil Tools.

This paper will discuss the design, development, qualification and intended field application of a threaded and coupled connector for a sour service compatible T 95 deepwater completion and workover riser.

This paper will detail intended field application of the connector; key aspects of the design and development processes (customer-defined design specifications/requirements, concept development, extensive use of finite element analysis, final design selection); and connector qualification program and results focusing on high-volume make-and-break performance, static loading and sealability, dynamic loading and sealability, and effects of dynamic loading on static loading performance.

SPE/IADC 104747

New Offshore Rigless Intervention System. D. Harris and P.G. Adams, BJ Tubular Services.

This paper will discuss the successful use of a new "rigless intervention system" (RIS) for the abandonment of conductors, pre-installation of conductors, sidetrack and whipstock operations and as an alternative to an offshore workover rig. The RIS has a mast that is 76 ft high that can be installed in modular sections and is capable of cutting and laying out 50 ft sections of conductor with all the inner strings securely held inside. Three major projects have been performed in the Gulf of Mexico, and the RIS has been used for the pre-installation of 12 conductors on a platform in West Africa. ♠