SPE/IADC 105454: Use of a Micro Flux Control method could offer a better way to address kick detection in oil- and synthetic-based fluids.

and results of foam hydraulics predictions for directional and horizontal wellbores.

SPE/IADC 105471

The Introduction of Electromagnetic LWD Technology in Saudi Arabia — A Case History and Future Application to Underbalanced Campaigns. M.A. Muqeem, C.M. Jarrett, A.M. Jeffri, Saudi Aramco; D. Weisbeck, M. Mallahy, N. Forge, A.J. Branch, Weatherford.

The first Electromagnetic Logging While Drilling (EM LWD) Triple Combo operation with the Extended Range set-up was successfully completed in Saudi Arabia. The 6 1/8-in. horizontal section of the Hawiyah 473 well was drilled underbalanced in one run.

The objective was to evaluate the feasibility of EM transmission utilised in conjunction with LWD triple combo and annulus pressure sensors in the 6 1/8-in. horizontal section. This particular well was drilled UBD with single phase fluid; future wells will require the use of gas injection to achieve UBD conditions. The injection of gas through the drill pipe precludes the use of mud pulse telemetry. EM telemetry was required to be proven to allow a continuation in the UBD planning process to include real-time LWD technology.

EM transmission of LWD triple combo and annulus pressure data in real time allowed 3,089 ft of 6 1/8-in. horizontal section to be successfully geosteered and drilled in one bit run while maintaining underbalanced conditions.

Technical Session 14: Cementing

SPE/IADC 105781

Self-Healing Cement — Novel Technology to Achieve Leak-Free Wells. P. Cavanagh, Suncor Energy; C.R. Johnson, S. LeRoy-Delage, G. DeBruijn, I. Cooper, D. Guillot, H. Bulte and B. Dargaud, Schlumberger.

The number of wells worldwide that leak or have sustained casing pressure is an astonishingly high percentage. Throughout the lifecycle of a well, unplanned changes can contribute to unknown damage to the cement sheath integrity, or the generation of a microannulus. With a flow path, hydrocarbons can either migrate to surface, or become trapped below the wellhead leading to pressure build-up.

The paper will describe a novel isolation solution that is activated only when a cement integrity problem occurs. The solution will automatically and rapidly form a complete hydraulic barrier by swelling in the presence of hydrocarbon flow, sealing damage caused by a change in wellbore conditions, and one that continues to re-seal if further damage occurs.

SPE/IADC 105437

Mathematical Temperature Simulators for Drilling Deepwater HTHP Wells: Comparisons, Applications and Limitations. D. Stiles and M. Trigg, ExxonMobil.

The widespread application and acceptance of mathematical simulators to model wellbore temperatures during drilling operations has grown in recent years. Limited work has validated some of these models against measured well temperatures, but no comparison among the results, applications and limitations of the various models has been published.

Part one of this paper presents a comparison of cementing temperature results from 3 models widely used. Part two presents the circulating temperature model and temperature surveillance program utilized to drill and test a deepwater HTHP well. Additionally, the functionalities of each of the temperature simulators and how those functionalities may impact the results are discussed.

SPE/IADC 105227

Enhanced Cementing Practices Address Unique Issues Found with Solid Expandable Tubular Applications. J. Heathman, Halliburton; E. Arredondo and A. Olufowoshe, Enventure.

This paper will examine the evolution of cementing processes and products for solid expandable tubulars. Emphasis will be placed on best practices and lessons learned. It will also discuss foreseeable application trends in expandable use and logical modifications and enhancements in cementing procedures, technology and chemistries. Checklists for key slurry design issues and how they correlate with the job logistics of the expansion operation will also be included.

SPE/IADC 105648

Application of Enhanced Ultrasonic Measurements for Cement and Casing Evaluation. C. Morris, L. Sabbagh, R. van Kuijk and B. Froelich, Schlumberger; R. Wydrinski and J. Hupp, BP.

The hydraulic isolation of the wellbore casing and cement is critical. Current acoustic evaluation techniques may be limited by the acoustic properties of the material behind casing and by the inability to see beyond the cemented region near the casing. A new ultrasonic imaging tool has been developed that combines the classical pulse echo technique with a new ultrasonic technique that provides temporally compact echoes arising from propagation along the casing and also reflections at the cement formation interface.

A field study was performed to evaluate the results provided by both sonic and ultrasonic tools in the different cement materials, drilling fluids, and casing sizes. Field examples are presented to illustrate the actual response of the new ultrasonic tool to these various completion environments.

SPE/IADC 105903

Are Preflushes Really Contributing to Mud Displacement During Primary Cementing? D.J. Guillot and J. Desroches, Schlumberger; I. Frigaard, U of British Columbia.

During a primary cementing operation, direct contact between the drilling fluid and the cement slurry that is to be placed in the wellbore must be prevented because these fluids are usually incompatible. To do this, special fluids — called preflushes and/or spacers — are pumped ahead of the cement slurry This paper illustrates how an advanced numerical fluid placement simulator helps understanding how these preflushes work. It clearly demonstrates that, in a number of cases, preflushes do not prevent direct contact between the drilling fluid and the cement slurry, even when industry accepted rules are used to design them. In such circumstances the cement slurry is directly displacing the drilling fluid, with all the risks associated.

Technical Session 15: Tubulars II

SPE/IADC 105602

Effect of Length: Diameter Ratio on Collapse Test Results and Frame Design. P.D. Pattillo, BP.

Conventional design equations for well tubular collapse assume the tube to be of infinite length. By contrast, the experimental test fixtures used to derive collapse design equations are of finite length, introducing the possibility of the sample's collapse resistance being influenced by the constraint at the sample ends. The current study is an extension of a previous modeling effort that employs a set of nonlinear cylindrical shell equations to investigate the effect of length to diameter ratio on collapse. The discussion begins with a review of the governing equations. A numerical model based on the shell theory is used to discuss the behavior of collapse samples, illustrating sensitivities to geometry and mechanical constitution. The discussion then focuses on a proper model of test fixture end constraints. The practical example of tieback stem design completes the discussion.