Executive Summary

Many thanks to our authors for their submissions. Please keep your manuscripts coming!

Because we recently had some respective cases, let me clarify the following: In the submission template for an SPE journal, the corresponding author is asked if the manuscript “or a substantially similar version of this paper has been submitted concurrently or previously for peer review in another SPE or other journal” (underlining by me). If the response is “No,” then the paper is acceptable for SPE peer review. To avoid later disappointment of all parties involved, I kindly request answering this question honestly, not only to spare our reviewers unnecessary work (we are an organization of volunteers), but also—in my “old-fashioned” view—out of fairness and respect to those authors who do not submit to us if they have already pursued a publication elsewhere.

Some of you might be interested to learn that SPE is currently in the process of revising our policy for handling discussions (comment on an article and author reply), and the updated version will be posted to www.spe.org/publications/ in the last quarter of 2017.

Now on to our articles, which are hoped to support you in your professional endeavors.

Completion. For all colleagues tasked with the selection of sand control screens, our first article is highly relevant, especially if the installation of multilayered metal-mesh (MMS, “premium”) screens with plain-square mesh or plain Dutch weave is contemplated.

In paper Factors Governing the Predicted Performance of Multilayered Metal-Mesh Screens, the authors present their investigation of the pore size distribution of the complete MMS “system,” comprising protection/filter/support layers, which can be different from the specified nominal rating of the filter layer only. The influence of aspects like the overlap between layers with different mesh, the alignment of the filter layer with support or protection layers, and the relative pore size ratio of these screen layers were investigated by numerical modeling.

It is shown that the nominal rating of the filter layer alone could be misleading for the screen types investigated (in my words: possibly, it will be less for the complete “system MMS” with only smaller particles able to pass than originally planned for) and respective recommendations for screen selection, specification, and quality control are provided.

Drilling. Although we all hope that actual execution will not be required, our next paper covers an important aspect of well control: the planning of relief wells. This can be even more of a challenge if prolific subsea gas wells are to be killed, which is discussed for a field in 400 to 800 ft (120–245 m) of water offshore Western Australia.

Blowout Prevention and Relief-Well Planning for the Wheatstone Big-Bore Gas-Well Project starts with a description of well design and reservoir characteristics, their implications for well control, and the strategy for reservoir entry. The relief-well planning process (two are required for every development well) covers aspects such as gas plume modeling, possible rig locations, relief-well trajectory, target-well interception, and pump-rate limitations for a dynamic kill with weighted fluid (erosion risk).

The field development was finally executed without the need for any relief-well drilling. Having worked on offshore big-bore gas wells (on a fixed platform), I, personally, found the publicly available literature “a bit limited,” and therefore much appreciate that the authors share their thought process and the selected approach with us.

We stay subsea with our third paper, which is recommended highly to all colleagues concerned with well design, because offering helpful insights about how to maintain long-term (subsea) well integrity here means offering different mitigation measures for annular pressure build-up (APB) situations in annuli that cannot be vented.

In Design and Performance of Annular-Pressure-Buildup Mitigation Techniques, the authors begin with a detailed description of APB loads during production and how much APB could be allowed. If mitigation is required, two categories are introduced—Type I: reducing lateral heat loss from the production conduit (i.e., vacuum insulated tubing, VIT) and Type II: reducing annular “stiffness” (psi/°F) (i.e., open casing shoes, rupture disks, crushable foam, gas caps). Design considerations for rupture disks, solid syntactic foam, nitrified spacers, VIT, and open holes (top of cement below the previous casing shoe) are shared, together with several calculation examples.
Because it also provides a thorough literature review about APB mitigation techniques available in general (some only laboratory tested up to now), I regard this paper as very useful for a wide range of readers, from somebody looking for a comprehensive introduction into the topic to seasoned APB-control practitioners.

That the analysis of data continuously recorded on a drilling rig can lead to efficiency gains should be of no surprise to the readers of SPE Drilling & Completion. And in our next paper, we present how respective computation could support preventing stuck pipe (drillstring, casing, completion) events with all their trouble associated (i.e., time and cost).

Stuck-Pipe Prediction by Use of Automated Real-Time Modeling and Data Analysis describes how hydraulics and torque and drag software (deviation of actual data from the real-time model) and trend analysis of real-time data (rate of change), nowadays routinely recorded on many rigs, are combined to determine a stuck-pipe-risk (SPR). Leading indicators for an impeding stuck-pipe event were identified from historical data sets of 36 stuck-pipe incidents, showing that there is no single, specific indicator for all. The analysis method is discussed in detail with two examples using real-time data available from rigs where stuck-pipe incidents had occurred.

The method will be further validated and tested, but the authors already show that in each test case, the SPR was >50% before the pipe actually became stuck, no false alerts were produced, and the warning time provided would have been between 9 to 162 minutes. In my view, a good example of how drilling efficiency could be improved by using data already recorded and available.

If you are concerned with hole cleaning, be it in the planning stage or during actual drilling operations, our next paper is for you, because here we offer the validation of a cuttings transport model with experiments and actual rig data [downhole pressure (annular ECD) and returned cuttings volume].

Cuttings-Transport Simulation Combined With Large-Scale-Flow-Loop Experimental Results and Logging-While-Drilling Data for Hole-Cleaning Evaluation in Directional Drilling describes the transient cuttings transport simulator (equations for a two-layer model) and how it was validated using flow loop experiments. It is subsequently compared to actual data from the 12 1/4-in. and 8 1/2-in. sections of a 4500 m (14,750 ft) MD deviated well and potential reasons for differences to the calculated results (i.e., in cumulative cuttings volume or ECD) are discussed (string rotation, pipe eccentricity, cuttings-packing fraction).

The authors show that the simulator can be used to identify normally “invisible” issues such as (average) borehole enlargement or cuttings accumulating downhole and plan further improvements by comparing it also with caliper and downhole torque data in future. And you might want to consider the measurement of cuttings on surface for a better estimation of hole cleaning efficiency. Certainly not a new idea, but still uncommon on most rigs—at least the ones I see.

For all readers interested in managed pressure drilling (MPD), the next paper is highly recommended, because it shows how one of its variants—here, controlled annular mud level (CAML) offshore drilling—can help to reduce the number of casing strings required (i.e., time and cost).

In Casing-Design Optimization With CAML Technique and Drilling-Fluid Performance, the authors first describe the CAML approach, which is a dual-gradient method using a submersible pump set at mid-riser level to circulate mud by means of a dedicated return line back to the rig. A comparison of casing schemes in conventional and CAML drilling of an 18,140-ft (5500-m) example well in 8,200 ft (2500 m) of water follows, together with a discussion of the effect of drilling fluid properties (i.e., yield point and plastic viscosity).

It is concluded that, for the well studied, CAML drilling could help to reduce the number of required casing strings from five to three, corresponding to a 26% reduction in total casing-length (summation of all individual string lengths), and that it would also provide more flexibility for the used mud’s rheological properties.
Our next paper is a “must read” for the well designers amongst us, because it discusses an alternative approach to the traditional, and commonly used, safety factor (SF) calculation according to API/ISO, which could result in too optimistic of a collapse SF, especially in load cases with high effective axial stresses.

In paper The Vector Approach to Safety Factors for Tubular Design, the authors provide an introduction to tubular design and load scenarios (reliability-based and deterministic design) and explain the theory of the proposed approach, called Vector SF. In three examples (vertical well with casing string under tension, deviated well with evacuated tubing, horizontal liner with cold fluid injection), the collapse load Vector SF is compared with the traditionally calculated one. It was always found to be smaller, because the traditional calculation assumes the effective axial load as constant with increasing collapse load, while the proposed Vector SF considers the variation of all load components.

The authors point out that the Vector SF approach is consistent with the established definition in traditional pipe body triaxial burst design, where SF equals material yield strength over von Mises equivalent stress, and it could also be used for connections with a defined strength envelope. I encourage you to read it with an open mind, because also well-established ways of calculation might still leave room for further improvement.

That’s it for this third issue in 2017. On behalf of the entire Editorial Review Committee, I thank you for your continued support of SPE Drilling & Completion.

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