IADC Well Control Committee
Meeting Minutes
13th September 2018
IADC Crown Center
Houston, TX USA

Contractor roundtable

An informal discussion of drilling contractors was held prior to the Well Control Committee meeting. Key topics discussed included the following:

- Increasing contractor participation in Committee
- BSEE update meeting on bolting
- Contractor involvement in MPD operations
- Serious well control incident offshore Norway in 2016
- Status of Well Control Rule revision
- Operator requirements for real time monitoring
- Monitoring of discrete hydraulic rigs
- "Predictive" BOP monitoring

Well Control Committee Meeting

Welcome & Introductions

Pete Bennett of Pacific Drilling (Committee Chairman) opened the meeting and welcomed the attendees. Steve Kropla of IADC provided a building safety briefing and reminded everyone the meeting was subject to the IADC Antitrust Policy and Guidelines.

Mr. Bennett asked those present to introduce themselves.

API Standard 53 Update

Ricky Cummings of Chevron, Chairman of the API Standard 53 (S53) task group, provided an update on the status of the 5th edition, expected to be released before the end of the year. The current 4th edition was released as a standard in 2012, with an addendum to it published in 2016. The 5th edition will have a new title, *Well Control Equipment Systems for Drilling Wells*. (The 4th edition is titled *Blowout Prevention Equipment Systems for Drilling Wells*.)

Mr. Cummings said the task group had received good participation from every sector of industry throughout the year, with increased drilling contractor participation as the process developed.

The 5th edition has undergone a major structural change with the General section including both surface and subsea BOPs. These had previously been in separate sections. In addition, a lot of informative statements included in earlier editions have been removed. This will allow regulators to reference API S53 in its entirety as well as to allow companies to easily audit themselves for compliance.

Mr. Cummings noted the informative statements were included in earlier editions to explain why certain revisions had been made, *e.g.*, as the result of incidents. Though removed from the 5th edition, these have been captured and it is hoped that they can be channeled through well control training groups and operators as a learning resource. The task group is still working on the mechanics of how to distribute these, possibly through IADC.

A major shift in the document was made to surface BOP pressure requirements. Originally, BOP requirements were dictated by the rated working pressure (RWP) of the BOPs. The 5th edition will shift BOP requirements to be driven by the maximum allowable surface pressure (MASP) of well and not the RWP of available equipment.

The task group had initially proposed a blind shear ram (BSR) requirement for 3000psi MASP surface wells. Onshore equipment owners opposed this due to lack of data on thru-drill string blowouts. The 5th Edition BSR requirement for land rigs will remain only for 10,000 psi MASP wells and higher. Thru-drill string blowouts will be studied for a possible 6th Edition revision. Meanwhile, a Risk Assessment will be required to determine if a BSR is required on Land Operations. The standard will include a clear list of elements to include in the risk assessment.

Mr. Cummings summarized other notable changes that will appear in the 5th edition:

- S53 is intended as a field document, so design requirements have been removed and passed on to relevant Spec documents in SC16.
- Testing criteria and frequency have been consolidated into enhanced tables in Annex C. These were listed in multiple locations in the 4th edition.
- Testing while pad drilling will remain on a 21-day cycle when moving from wellhead to wellhead, though a function test needs to be done on every move. Previously, everything had to be retested when moving to a new wellhead, even on short-duration wells.
- Blowout prevention terms (BOP, BOPE, etc.) have been completely reviewed and definitions provided; this is what drove the document's title change.
- Bolting requirements have been added to follow SC16. The equipment owner's maintenance system shall specify the replacement schedule to API 16A & 16C bolting.
- A focus on land BOPs and acknowledgement of differences for land vs. offshore requirements for surface BOPs

WellSharp Update

Gerardo Barrera of IADC gave an update on WellSharp activity. Since his report at the June meeting, there have been over 2000 WellSharp courses conducted, an average of 168.4 courses a week with an average class size of 5.1 students. He stated he will provide separate retest numbers in future statistics.

For the year to date, there have been a total of 31,636 trainees assessed with a 94.5% passing rate and an average score of 85%. He noted that IADC appears to be close to issuing the 100,000th WellSharp certificate.

Kristin Blissit of IADC gave an update on program development. For WellSharp well servicing, IADC is now working on the introductory level, which will include snubbing, workover and wireline. While reviewing the curriculum, the development group is also reviewing questions that have come in from operators or service companies.

WellSharp Plus will be finalized by the end of this year. IADC is planning to pilot the WellSharp Plus facilitator course, probably in November. She stated that there will be a fee for the course, but that participants will have their facilitator certificates updated for WellSharp Plus. Those interested in participating should contact her at kristin.blissit@iadc.org.

Ms. Blissit also stated that workgroups developing the Level 5 curriculum have been meeting and are making progress, though the content and structure have not yet been finalized.

The group took a short break.

Immersive Simulation Training

Kim Laursen gave a presentation on full team training with immersive simulation, enhanced well control training, and Managed Pressure Drilling training. He began with the history of Maersk Training, which eventually emerged out of an in-house program Maersk Drilling had developed following a blowout on the Maersk Explorer in the North Sea in 1977. The damaged traveling block from the Explorer is now on display at Maersk Training's center in Svenborg, Denmark.

He noted that IOGP 476 recommended scenario based training with integrated CRM. These were used as the foundation for their team-based well control training. This training usually involves the company man working with the full team in a high-fidelity simulator with different scenarios designed to challenge the crews. Have noted one extreme case where a rigsite consultant had caused a blowout in the simulator, and as a result lost his contract with the operator. He stated the big value feature of the course is in the detailed debriefings following each exercise. Maersk Training's philosophy is that it is better to have those involved in the exercise debrief themselves, rather than having someone else do it for them. Maersk provides tools for the crews to facilitate effective debriefings, which are done for both the technical and CRM parts of the course.

No individual test is given for team based well control course, as it is felt this would occupy too much focus and become a distraction to performance. If an exercise is seen to be going badly, sometimes the instructors will intervene and stop the scenario when they feel that opportunity for learning has been hindered. If a customer has identified specific areas for improvement, Maersk Training will customize a course to focus on the objectives that have been identified. Procedures are also field tested to ensure they are understood.

The Enhanced Well Control course is offered to experienced personnel who have been through conventional well control training many times. Participants start with a standard well control test on the first day, and then perform simulator exercises for the rest of the week. The focus is on scenario-based training with an assessment of both CRM and technical lessons.

Maersk Training's Managed Pressure Drilling course is built with many of the characteristics of the Team Based and Enhanced Well Control courses. It focuses on MPD and DWIS – Drilling a Well In the Simulator. Mr. Laursen said sometimes the courses include a third party operator for the MPD equipment. In other cases, the drillers themselves may have to operate the MPD equipment. The simulator used in the MPD course utilizes actual field-ready MPD software from third parties.

Riser Gas Research at Texas A&M University

Omer Kaldirim and Pedro Sousa of Texas A&M University provided a joint presentation on riser gas research underway as part of a project partnership with A&M and Louisiana State University. Mr. Kaldirim is working primarily with gas migration using a full scale flowloop. Mr. Souza is working on characterizing drilling fluids over a large range of pressure and temperatures.

Pedro Souza stated a problem is that wellbore flow dynamics is not fully understood in well control scenarios. During gas migration, hydraulic simulators should also account for formation fluid solubility, changes in mud rheology, and changes in mud weight (especially in HPHT).

The objective is to simulate gas migration with a full scale flowloop at LSU, and to characterize drilling fluids at large range of pressures and temperatures, from 0 – 40,000 psig and 40 – 450 °F using a numerical model of wellbore behavior and coupled formation-wellbore dynamics.

Testing is performed on a HPHT viscometer Chandler 7600 which measures fluid rheology. The viscometer has has been modified so that hydraulic fluid is completely separated from testing fluid, as this can create a problem with diesel. A free port on the testing vessel is used as a gas injection port to text mixtures of mud and gas. This is a high pressure cylinder with a piston inside, propelled with propane as gas (methane is more difficult due to procedural issues).

Mr. Souza said experiments are still being conducted, but preliminary results show base fluids are much more compressible than usually assumed, with up to 15 percent increase in mud weight in high pressure conditions. Viscosity drops significantly in the presence of formation fluid, by a factor of 10. This indicates the potential to capture kicks/losses as they occur in drilling operations with appropriate instrumentation (reliable flow-out measurement).

Mr. Kaldirim explained he was working on a model for gas expansion in top section of riser, which can lead to unloading and blowouts. The plan is to perform various simulations and tests for migration rates using a dual gradient drilling lab he built with Dr. Jerome Schubert.

He stated the objective is to measure as much pressure as possible along with the flow rates and capture video so that it can be observed and studied more closely. He illustrated the lab design, which uses clear tubing to allow video and features flow loop open to the atmosphere at top. It includes a mud gas separator and mud tank; they are now installing a mud mixer. A vacuum pump was installed to lower pressure.

During the testing, Mr. Kaldirim observed and measured gas expansion in vacuum, with video confirmation of expansion which showed a slight increase in hydrostatic pressure. The system held 88% vacuum pressure ~ 26 in-Hg (1.95 psia).

A conclusion from the testing was that a larger gas injection volume and line needed, and that a longer fluid column is necessary to measure the change in the size of the bubble. To do this, additional experimental work will be performed at the Tower Lab, which features a 140 foot tall flow loop with 6” and 4” piping. Two overflow tanks will be installed at the top of the tower to avoid flooding. Cameras will be installed on every floor. Mr. Kaldirim said this should allow the researchers to see how expansion at the base affects fluid level, but more importantly to see what happens when gas is at a higher level within the fluid column.

Ongoing work will involve additional modifications to the DGD Lab at Texas A&M, including a larger gas container at base, a 6” butterfly valve to improve gas displacement, additional and recalibrated pressure transducers to measure vacuum and positive pressure, and two overflow containers with flow sensors to measure overflow and unloading.

Update on WCC Subcommittees & Workgroups

Well Control Practices Subcommittee: Paul Sonnemann, SafeKick – Mr. Sonnemann reviewed a list of 30 practices that had been identified for review by the Subcommittee. Often what we are saying and teaching is not the best. Would like to have discussion to discuss pros and cons and whether alternative techniques exist. The Subcommittee will meet following the general Well Control Committee meeting.

Simulator Subcommittee – Michael Arnold, Intertek – Mr. Arnold was not present so there was no report. However, Mr. Kropla noted Mr. Arnold had indicated he wished to discuss the future of this Subcommittee at the next meeting.

Curriculum Subcommittee: Matt Parizi, Chevron – There was no report from this group.

Barriers Subcommittee – Scott Randall, PlusAlpha Risk – Mr. Randall stated he would like to get the barriers group involved in studying human factors. He also noted that since no standard barrier classification system exists, he would like to work on that. He stated he would also like for the group to collaborate with other IADC committees or industry groups.

Other Business

Leon Robinson, Chairman of IADC's Technical Publications Committee, requested assistance from anyone in the Well Control Committee who might be interested in an IADC book focused on well control.

Mr. Kropla noted the next IADC International Well Control Conference & Exhibition will take place on 23rd and 24th October at the Melia Milano Hotel in Milan, Italy.

Next Meeting

The next Well Control Committee meeting will be at 9 a.m. on Tuesday, 11th December 2018 at IADC's Crown Center 1 in Houston. This will take place at IADC's offices at 3657 Briarpark Drive, Suite 200. The meeting will be preceded by a Drilling Contractors Roundtable from 8 a.m. to 9 a.m.

Attendees:

Mohamed	Boukamcha	**ABS**
Scott	Randall	**BMC GLOBAL**
Neil	Funwie	**BSEE**
Ricky	Cummings	**CHEVRON**
Chuck	Boyd	**CS INC.**
Daryn	Fisher	**CUDD WELL CONTROL**
Jon	Shoemaker	**DIAMOND OFFSHORE DRILLING, INC**
Chris	Mills	**DIAMOND OFFSHORE**
Jim	Krupa	**DRILLING SYSTEMS (UK) LTD**
Euan	Kennedy	**DRILLING SYSTEMS (UK) LTD**
Chris	Stewart	**ENSCO PLC**
Steve	Kropla	**IADC**
Marlene	Betancourt	**IADC**
Mark	Denkowski	**IADC**
Kristin	Blissit	**IADC**

Leon	Robinson	**INTERNATIONAL DRILLING CONSULTANTS**
John	Juda	**KINETIC PRESSURE CONTROL**
Reese	Jones	**KINETIC PRESSURE CONTROL**
Fenil	Shah	**LEARN TO DRILL**
Syed	Nahri	**LOUISIANA STATE UNIVERSITY**
Martin	Carnie	**MAERSK DRILLING**
Kim	Laursen	**MAERSK TRAINING**
Steve	Ronan	**OTC SOLUTIONS, LLC**
Pete	Bennett	**PACIFIC DRILLING**
Isamu Ikeda	Junior	**PETROBRAS UNIVERSITY**
Roger	Sanchez	**RIG QA INTERNATIONAL INC**
Eliot	Doyle	**ROWAN COMPANIES**
Paul	Sonnemann	**SAFEKICK**
Neil	Gooding	**SEADRILL**
Marcus	Mason	**SMITH MASON & COMPANY, LLC**
Joshua	Robnett	**SUBSEA SOLUTIONS, LLC**
Omer	Kaldirim	**TEXAS A&M UNIVERSITY IADC STUDENT CHAPTER**
Pedro	Sousa	**TEXAS A&M UNIVERSITY IADC STUDENT CHAPTER**
Adam	Hess	**TRANSOCEAN**
Barry	Braniff	**TRANSOCEAN**
Barry J.	Cooper	**WELL CONTROL SCHOOL-SYSTEM 21**
Haris	Qureshi	**WILD WELL CONTROL INC.**
Steve	Richert	**WILD WELL CONTROL INC.**
Todd	Roberts	**WILD WELL CONTROL INC.**