



WCI Board of Directors Meeting
09:00-12:00 (CDT), Tuesday, 6 November 2018
Ritz-Carlton Hotel, New Orleans, Louisiana

Participants:

Bob Warren, IADC
Eric Daflon, Total
Gene Stahl, Precision Drilling
Jason McFarland, IADC
James Taylor, Halliburton
James Pettigrew, OESI
Jørn Madsen, Maersk Drilling
Kim McHugh, Chevron
Leesa Teel, IADC
Lyndol Dew, WCI Chairman
Marcus Mason, Smith Mason
Mark Denkowski, IADC
Mike Garvin, Patterson-UTI
Mike Holcomb, Patterson-UTI
Mike Nuss, Ensign Energy Services
Nafiz Tamin, Texas A&M
Olav Skar for Cindy Taff, Shell
Sara Gay for Andy Krieger, BP
Shawn Firenza for Joe Rovig, NOV
Simon Drew, KCA Deutag
Siv Hilde Houmb, Secure-NOK
Steve Brady for Carey Lowe, Ensco plc
Steve Kropla, IADC
Tom Burke, Rowan Companies

1. Introductions, New member Welcome & Antitrust Statement

Lyndol Dew delivered welcoming remarks. A hotel representative delivered a facility safety briefing. Mr. Dew conducted roll call and noted the meeting was subject to the IADC Antitrust Policy & Guidelines. Mr. Kropla reported on new members of the WCI BOD – James Taylor of Halliburton and Mike Nuss of Ensign Energy. He noted the new members will be formally approved by the IADC Executive Committee at its meeting tomorrow.

2. Presentation – Update on WellSafe Quality Assurance Program

Ms. McHugh presented an update on Chevron's WellSafe Quality Assurance Program. Ms. McHugh noted that the purpose of WellSafe is to provide maximum reasonable assurance that well control will be maintained during Chevron Drilling and Completions (D&C) operations. She noted that the leading indicators used by the program are provided primarily by the WellSafe Execution Assurance Requirements (EAR) Checklist.

This checklist is used to verify that operations are executed in accordance with the design / plan. Lagging indicators include Well Control Events Classifications from Tier 1 (surface blowout); Tier 2 (underground blowout requiring third party assistance); Tier 3 (well control event with complications) and Tier 4 (well control event without complications).

She said that since 2016, the number of EAR Checklist items that did not meet requirements has consistently fallen. Since 2015, the number of Tier 1-3 events experienced by the company has also fallen considerably.

Nevertheless, she stressed a need for “chronic unease,” and described a number of significant issues involving checklist items that had been experienced in the past two years. She stated most gaps involve well control preparedness and well control equipment. Chevron feels that quarterly rig assessments are effective in identifying these gaps, though opportunities exist to improve this process.

Another area of concern for Chevron is surface BOP performance. The company is currently focused on gathering additional surface BOP data, specifically for onshore operations.

3. Presentation – Underbalanced Operations Training for Rig Crews

Mr. Garvin and Mr. Mason presented an overview of the underbalanced operations training program focusing on underbalanced well control fundamentals developed by Patterson-UTI and Smith Mason. Mr. Garvin noted that prior to 2014, “conventional” wells accounted for most drilling activity in the US, with a relatively small number of “unconventional” wells drilled underbalanced (UBO) or with Managed Pressure Drilling (MPD). Now, he said “Unconventional is the new conventional,” with the bulk of wells now drilled with UBO, MPD or Returns Managed Drilling (RMD). After a gap analysis showed that current WellSharp curriculum was largely focused on conventional wells, Patterson-UTI contracted Smith Mason & Co. to develop a specialized course for rig workers in underbalanced well control fundamentals (UBWCF). The UBWCF curriculum includes instruction on long lateral shale plays, underbalanced well procedures, increased ROP in today’s environment, ballooning, modernized equipment, and communications techniques. The two-day course is designed to provide employees with the knowledge required to allow them to make good well control decisions. A UBWCF pilot program was launched in July and by year end approximately 1,300 Patterson-UTI employees will have participated in the program. Plans to share the program with industry are underway. An underbalanced operations “add-on” to WellSharp which would include UBWCF is currently being reviewed. It was noted this training would be applicable to Canada and Argentina as well as the US.

4. Presentation – “My Wells Barrier” Initiative

Mr. Drew presented an overview of KCA’s “My Wells Barrier” initiative. The program was developed to define well control responsibilities for all rig positions. Gaps were assessed, and a booklet was created that highlights step by step processes and verification expectations. The program stresses that maintaining barriers is not just the job of the driller -- it is the job of the whole team on the rig, from the client representative through the whole drilling crew to service hands working on the rig. To begin, the “My Well Barriers” booklets are to be issued to Assistant Drillers and above. They must watch an introductory media presentation which explains the booklet in detail before it is issued to them. Once all Assistant Drillers and above have been issued the booklet, the

process will then commence for the other crew members. The booklets were rolled out across the KCA fleet and will be reviewed every six months. The booklets will be available in multiple languages.

5. Presentation – IADC Cybersecurity Committee Initiatives

Ms. Houmb shared an overview of the IADC Cybersecurity Committee and its initiatives. She explained that the core focus of the Cybersecurity Committee is to help drilling contractors to comply with current regulations and standards, and to develop easy to use, practical guidelines designed to protect drilling assets. *Guidelines for Assessing and Managing Cybersecurity Threats to Drilling Assets* were first issued in 2015, followed by *Guidelines for Baseline Cybersecurity for Drilling Assets* in early 2018. *Guidelines for Network Segmentation* and *Cybersecurity Training v1.0* will be released in December 2018. In June 2019, the Committee plans to issue *Guidelines for Hardening of Control Systems* and *Guidelines for Security Monitoring and Audit*. Ms. Houmb noted a training workshop is planned for 13 December, hosted by BP. She also reported on the drillers' group focusing on industrial control systems, sponsored by Tom Burke, Rowan Companies. This group will likely be formally adopted as a sub-committee to the IADC Cybersecurity Committee. Volunteers are needed from the service company sector as well.

6. Presentation - OESI

Mr. Pettigrew shared an overview of OESI and its activities. OESI is an independent collaborative group working across all stakeholders. The group has three areas of focus – dialogue, training and research. Their initial contract with BSEE was for a 5-year term, which expires this month. An 8-month extension has been granted so the group can assess future activities.

7. Presentation – Early Kick Detection

Mr. Tamin, who is currently a student at Texas A&M University, presented an overview of his research project developing leading indicators for early kick detection. The project is sponsored by OESI. He reviewed conventional methods of kick detection, use of MWD/LWD technique, Managed Pressure Drilling, and other notable techniques. Mr. Tamin's current focus is on a general framework for developing sets of leading indicators and probabilistic models for predicting barrier failure events. Leading indicators are based on operational and organizational practices and performance measured over a certain time period combined with real-time indicators and physical observables such as changes in well parameters. He demonstrated a predictive model correlating organizational, operational and real-time indicators for assessing probabilities of barrier failure causes such as abnormal pore pressure issues. He noted the proposed model has three functions – to determine the probability of barrier failure initiating events; to assess efficiencies of kick detection systems; and to identify and improve factors influencing performances of kick detection parameters for higher efficiency. In conclusion, he stated that leading indicators-based models enable informed decision making with a relatively clear picture of the risk of a barrier failure.

8. Update – Well Control in Student Chapters

In the October WCI conference call, Mr. Lynch inquired about introducing a well control curriculum to universities with petroleum engineering programs. From this discussion, Mr. McFarland agreed to share what IADC is doing to engage and educate students about industry. IADC's Student Chapter initiative was launched in 2017, and currently has three Student Chapter members – Texas A&M, University of Louisiana at Lafayette,

and Missouri Science & Technology. Plans are underway to start a Chapter at the University of Wyoming as well. Several students will attend AGM this week. Plans are also underway to expand internationally. Considering industry's quest for diversity, Ms. McHugh suggested a minority, based university might be considered.

9. Human Factors in Well Control Workshop

Mr. Kropla reviewed plans for the upcoming Human Factors Workshop to be held on Monday, 4th March 2019 at the World Forum in The Hague. This workshop will be held in conjunction with the SPE/IADC Drilling Conference. He expects the program to be circulated later this month. The workshop was originally proposed by Shell at the June WCI meeting in Copenhagen.

10. Discussion – Future Activities

The Board discussed next steps and how WCI can impact the gaps. The Board discussed agenda items for the next meeting. An update for the IADC/IWCF white paper will be added to the agenda. Mr. Dew suggested the Board review the initial scope of work developed by the WCI. Members reviewed the original list and noted cybersecurity was missing. The Board agreed a better job could be done with respect to reporting and transparency, and BOP reliability, particularly with onshore operations. Mr. Dew suggested focus teams could be developed to work these issues. The Board discussed RAPID S53 and plans to add component and cycle data. The group discussed the impact of the data on future equipment development. The group agreed a better understanding of the data is necessary for actionable steps. Ms. McHugh suggested an update on the UBO/MPD training developed by Smith Mason and Patterson-UTI and Well Sharp be added to the agenda. Mr. Kropla will review key findings from the RAPID-S53 BOP Reliability database 2018 annual report at the June meeting. Mr. Brady suggested an update on the various API standards affecting well control be added to the agenda as well. Mrs. McHugh agreed to provide resources to lead the initiative on information sharing. Mr. Brady agreed to provide resources/lead the initiative on BOP standards.

11. Date & Venue of Next BOD Meeting

The next full meeting of the WCI Board will be at 14:00 CEST, Monday, 17th June 2019, at the NH Milano Congress Centre in Milan, Italy. Mr. Dew noted a conference call would be scheduled prior to the meeting, most likely in May.

12. Any Other Business/Adjournment

With no other business before the Board, the meeting was adjourned by Mr. Dew. Mr. Dew thanked the presenters and the Board for their participation.