The Newsletter

MARCH 2020
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Dear members and friends of the LPS,

On behalf of the whole of the LPS, I hope you are all well, and staying safe at home. For the safety of all our members, we made the decision to cancel our April evening lecture, which was due to be given by SPWLA distinguished lecture, Stein Ottar Stalheim of Equinor. Since taking this decision, the Geological Society have announced that they are closing their doors until at least the end of April.

For events beyond April, we are looking into options for presenting talks remotely. We may try applications such as Skype or Microsoft Teams, which will allow us to continue to hold events, and have interesting talks from all over the world, but whilst keeping everyone safe. Please bear with us and look out for updates in your inbox and on our website.

Our next One Day Seminar is planned for June; however, we are reviewing whether or not this will go ahead. Again, we will let you know nearer the time.

On a more positive note, we had a great time on Thursday 5th March at our seminar on ‘An Introduction to Production Geology and the role of the Cased Hole Logging Tool’, co-organised with the PESGB YP. Lots of great introductory talks were given, some remotely due to travel restrictions; but all were very well received. Thanks to everyone involved!

As a final reminder, you should have received an email from our VP Data Protection and Membership, Rebecca Lee, asking you to reply to her email to confirm that you are happy to renew your membership for 2020. We hope that you do all want to remain members and stay on the mailing list, so please do remember to reply! If you have not received this email, or if you know of anyone that would like to sign up for free LPS membership, please email Rebecca (Rebecca.Lee@halliburton.com) or see details on the website (https://lps.org.uk/membership/).

If you have any suggestions for how the LPS can best support each other and stay connected during the Corona virus outbreak, please do let us know. If you would like us to arrange more frequent remote presentations, or virtual demonstrations of software, or just send more emails, please get in touch and tell us your ideas!

Please stay safe in these uncertain times; and do stay in touch.

Warmest wishes,

Dawn Houliston
Calendar of events

Thursday 18th June 2020
9:00 am - 5:00 pm
TBD

One day seminar

Tuesday 21st July 2020
6:30 pm—7:30 pm
“Investigation of Physical Properties of Hydrocarbons in Unconventional Mudstones using 2D NMR Relaxometry”

Evening Lecture
Innovations in Wireline Cable Protection – Part 1

G. Wheater*

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Abstract

Cable protection technology has been commercial for 5 years and has been validated under the toughest of logging conditions, summarized in Table 1. To date, wireline cable protection has enabled over 130 safe and successful wireline runs in challenging wells worldwide, many with a history of offset cable sticking or fishing. An advanced modelling package determines the cable sticking risks on upcoming logging operations and recommends if wireline standoffs (WLSOs) should be deployed. The standoffs mitigate differential sticking and keyseating risks by suspending the cable above pre-determined “sticky zones” in the wellbore.

Ongoing research and development efforts continue to drive forward all aspects of the service. A few recent innovations are discussed below.

<table>
<thead>
<tr>
<th>MD (ft)</th>
<th>Temperature (°C)</th>
<th>Overbalance (psi)</th>
<th>UCS (psi)</th>
<th>Time on station (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30000</td>
<td>200</td>
<td>9500</td>
<td>&lt;1000</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1: Logging and borehole conditions for cable protection

**This is the first in a series of LPS articles by the current author. They will address different aspects of the same subject starting with this issue.**
1. Wellsite safety and operational efficiency:
Through a European funding initiative, Mike Locking’s design team at AMRC (the Advanced Manufacturing Research Centre, Sheffield University) undertook a work study of a wireline standoff operation in West Africa and came up with an array of suggestions to improve equipment handling and efficiency. Work is ongoing in this area. For now, we have reduced installation times from ≈ 2 mins per WLSO to ≈ 1 min (including winch driving between installation depths). This has been achieved through the use of a “top-hat“ working platform on the drill floor and a calibrated torque drill, illustrated in Figure 1. The 4 bolts that clamp the WLSO now take ≈ 15 seconds to install instead of 35 seconds – we are aiming to reduce that time even further (5-10 seconds). Hole coverage is improved with the top-hat and the risk of dropped objects is lower too.

Figure 1: Use of a “top-hat” workstation and an air-torque drill aid safe, consistent and efficient WLSO installations and removals.

2. Improved benchmarking
Our proprietary cable sticking database has grown in depth and breadth to allow better evaluation of cable sticking risks and clearer decisions on deployment of wireline standoffs. The database is global, with data from 65 wells that have had cable sticking or fishing. On average, 40% of wells with cable sticking escalate to fishing operations (they cannot pull free). Around 70% of the wells analysed are declared low risk (no need for standoffs); ≈ 30% of wells have standoffs mobilised and ≈ 22% of wells have them deployed (≈ 8% of deployments are cancelled after the well is TD’d – the final analysis being “benign”). Not once has a well been declared benign and then had sticking.
Innovations in Wireline Cable Protection

Part 1

The fictitious well illustrated in Figure 2 qualifies as “challenging” due to both keyseating and differential sticking risks. It would normally require pipe-conveyed logging but can safely be logged on wire with standoffs (quicker and lower cost, lower risk, better depth control and faster trip time in the event of probe plugging). As clients have pushed us to log more challenging wells with cable protection our technical confidence has grown considerably.

Figure 2: An example of a challenging (tortuous) well with keyseating and differential sticking risks. The cable thrust presented is the pressure applied by the cable against the formation and cake with the tool correlating up to the pretest station in sand #5. The red curve on the left track is the magnitude of the cable thrust; it is also shown in 3D vector form on the wellbore profile (right) by the clusters of dark red arrows (closely aligned with dog leg severities). Generally, above 0.5 lbs/ft we are concerned about differential sticking and above 2.5 lbs/ft we are concerned about keyseating.

Benchmarking continues to evolve with a new risk matrix that aids job planning and equipment selection, as illustrated in Figure 3. Side-by-side plots can aid in the choice of conveyance system elements, such as optimal cable type, weak-point rating and the use of wireline jars. Various sidetrack options can be quickly evaluated for drillers to establish the relative risk levels and how far a
trajectory can be pushed before pipe-conveyed or LWD might be a safer option.

Figure 3: A new risk matrix plot illustrates the differential sticking risk, the keyseating risk, and the capacity to pull free. A plot is evaluated for a given tool-string at a specific depth in the well, e.g. a formation sampling string on the deepest station in the programme.
Example wells using cable protection (for keyseating risk) are illustrated in Figure 4. All of these wells would be problematic on wireline without cable protection (high risk of sticking, fishing, NPT, wiper trips and contingent pipe conveyed logging).

Figure 4: Example wells that were logged with cable protection. The colour bands in the wellbores represents the dog-leg severities and the dark red arrows are 3D cable thrust vectors derived from the modelling. High thrusts near the CSG Shoe are a general symptom of keyseating risk; the more tensioned cable passing over a sequence of doglegs the greater the risk of cutting a cable slot, after which a combination of sticking forces may take hold. UCS is a critical factor for keyseating risk too; the softer the rock the more likely there will be a slot generated by the cable.

One future innovation, to be discussed at a later date, is our new digital standoff (WXSO) designed to gain new data about wellbore diagnostics and cable dynamics. It is the first cable mounted acquisition package in the wireline sector. It has been deployed four times to date and revealed many fascinating insights on cable behaviour during a logging run. Of strong interest is the statistical analysis of creep (measured by accelerometers) to improve formation tester targeting in thin beds: the goal is to advise clients on their pretest programs (dialing in creep corrections before running in hole and to reduce survey and clean-up times, improve gradient fits, and avoid the potential for packer damage from repeated tight tests at high overbalance.

3. Background reading on cable sticking and mitigation:
https://petrowiki.org/Wireline_keyseating (G. Wheater)

https://www.gaiaearthgroup.com/GCPS.html

Using Wireline Standoffs (WLSOs) To Mitigate Cable Sticking
https://www.onepetro.org/conference-paper/SPE-174068-MS

Wireline Cable Protection: Enabling Fluid Sampling In High-Risk Wellbores
https://www.onepetro.org/conference-paper/SPE-193232-MS
A message from the LPS Technical Editor Mohammed S Ameen:

Call for LPS Newsletter Articles

We would like to invite members and friends of the LPS to submit technical articles for future editions of the LPS Newsletter.

The LPS Newsletter welcomes submissions in a range of flexible formats such as a short story/article/announcement that fall within the following structures:

- **Technical Innovation News**: The LPS will include a section specifically allocated to short, topical, innovation-oriented news. This can be a paragraph or an extended abstract format to share with the community newly developed methods, tools, and newly registered patents. The objective is to disseminate the information to all interested parties within the LPS community and beyond. Innovation encompasses new designs or methods, with the ultimate objectives of better solutions to meeting needs, or realising a goal in a new technique. The innovations are key to providing industrial and academic teams with a competitive edge, and part of the process of innovation is to make end users and competitors aware of what is new. The LPS would like to contribute to promoting innovative ideas and processes through the newsletter communication.

- **Major Articles**: In depth articles discussing topics of interest. Such articles can involve a review of a particular subject or can address and discuss a specific method, tool, or an academic study finding. For example, articles may discuss the implementation experiences, implementation efforts of a tool or a method, and uncertainties in the outcome and areas for improvements.

- **Short Notes Articles**: These can be preliminary findings of academic and industrial R&D projects related to petrophysics, rock physics and rock mechanics. These short notes can be in the format of an extended abstract.

- **Educational Material**: This may include introducing a topical subject to the wider community. For example, there is a lot of discussions on Artificial Intelligence application in geosciences including petrophysics, rock physics etc. An article that describes the basic principles, historical background and current state of the art and challenges would be appropriate and timely.
The contribution formats
Articles should be submitted in Word format and with embedded figures.

Word count:

- Technical Innovation News: up to 500 words, and up to 4 figures/illustrations
- Major Articles: up to 3000 words and up to 15 figures/illustrations
- Short Notes Articles: up to 1500 words and 8 figures/illustrations
- Educational Material: up to 3000 words and up to 15 figures/illustrations

If anybody wants to contribute with material which has been previously published the LPS Editor requires approval of the original article author(s) and the publisher and a Word version of the article without graphics.

Why publish in the LPS Newsletter?
Articles submitted to the newsletter will benefit from rapid publication and flexible format. Furthermore, sharing technical innovation news give the inventors/service providers/researchers the exposure to potential end users and help in completing the innovation process into implementation and testing opportunities.

The deadline
Contributions should be sent to the LPS Technical Editor by email. Articles will be published on first come first serve basis subject to suitability of the article and readiness for publication with no editorial issues.

Frequency of publication
Accepted contribution for publications will be published in the monthly LPS newsletter.

The license and copyright
By submitting a contribution to the newsletter, you agree that the text which appears in the newsletter will be publicly available.
How to submit?
To submit a contribution to the newsletter please send your material at the first instance in a compressed pdf file format to the Technical Editor of the LPS: ameenms1958@gmail.com

All submitted material should have the full names and affiliation and contact details for the authors with an indication as to who is the corresponding author.

It is the responsibility of the author to get permission for the publication of material from their organization and third parties. LPS assumes that such permission is obtained before the material is submitted.

Commerciality should be avoided, and while preparing the material for publication the author should avoid any offense to others.

Templates for articles will be available on request from potential contributors.

Contact for queries/clarifications:
If you have further information/queries please contact:
The LPS Technical Editor, M. S. Ameen by email: ameenms1958@gmail.com
SPWLA has played a major global role in strengthening petrophysical education and strives to increase the awareness of the role petrophysics has in the oil and gas industry and the scientific community.

The LPS is a chapter of SPWLA and we encourage you all to become members of our parent organisation and join the "Home" for Formation Evaluation and Petrophysics.

Remember that professional and student membership has many benefits including:
- The Petrophysics Journal
- The new SPWLA Newsletter magazine
- Access to online literature resource
- Discounted registration for two "Topical Conferences" each year
- Access to monthly Webinars
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