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NEWSLETTER

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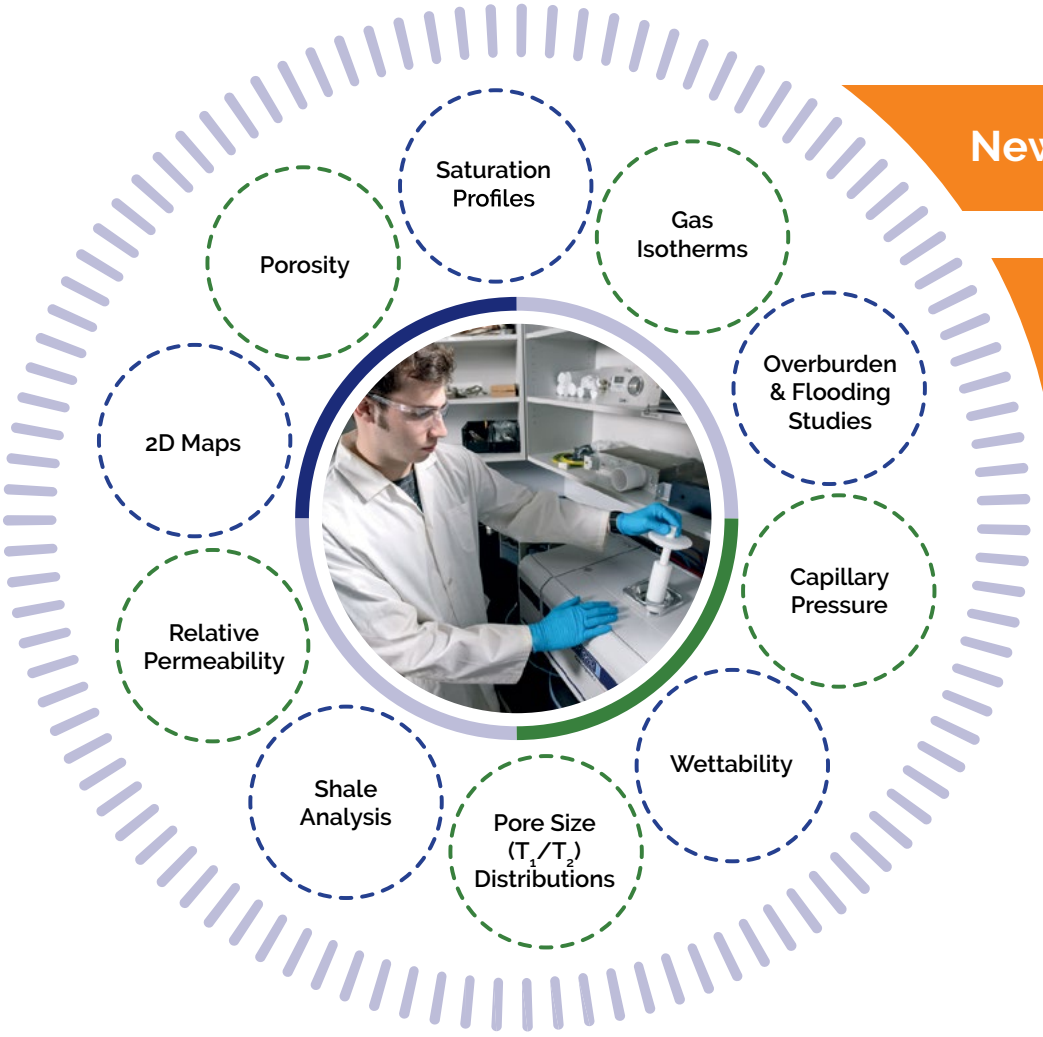

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INSIDE THIS EDITION

The Society of Petrophysicists and Well Log Analysts Board of Directors 2022–2023

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Notice: Articles published in SPWLA Today are not subject to formal peer review but are subject to editorial review and are verified for technical consistency and relevance.

CALENDAR OF EVENTS

September 2, 2022
Acoustics SIG
Borehole Acoustics: The Road Ahead
Houston, Texas
Acoustics SIG Webpage

September 12–14, 2022
NMR Fundamental and Overview Advanced Interpretations
Instructor: Brian Stambaugh
Online Training Webinar
www.spwla.org

September 13–16, 2022
The 27th JFES Formation Evaluation Symposium
Hybrid Event
Special Session: Geothermal
https://www.spwla-jfes.org

October 6–7, 2022
NMR SIG Fall Conference
Houston, Texas
NMR SIG Webpage

October 24, 2022
SPWLA Golf Tournament and Social
Blackhorse Golf Club
Cypress, Texas
www.spwla.org

November 1–3, 2022
Practical Seismic Petrophysics:
The Effective Use of Log Data for Seismic Analysis
Instructors: Tad Smith and Matt Blyth
Online Training Webinar
www.spwla.org

November 3–5, 2022
The 13th UPC International Symposium
Hosted by The East China Chapter of SPWLA
Topic: Frontiers and Challenges of Electric Logging Technology
www.spwla.org

June 10–14, 2023
SPWLA 64th Annual Symposium
Margaritaville Lake Resort
Lake Conroe, Texas, USA
www.spwla.org

About the Cover

The SPWLA has recently formed a Diversity, Equity, and Inclusion (DE&I) committee. Its goal is to educate and elevate awareness of diversity, equity, and inclusion within SPWLA and to create a welcoming environment for all.

From the President

Tegwyn JP Perkins
2022–2023
SPWLA President

Hello and welcome to my second column as SPWLA President for the *SPWLA Today* newsletter. I am going to start by reviewing some recent and upcoming events.

I would like to thank the SPWLA Saudi Arabia Chapter for inviting Regional Director **Jennifer Duarte** and me to their fifth anniversary celebration, where we delivered congratulatory speeches online. It was an excellent experience, and I wish this young and thriving chapter all the best for the future. In particular, I would like to thank **Dr. Faisal Alenezi** and **Dr. Mark Ma** for their tireless commitment to the chapter.

Together with AAPG, EAGE, and SPE, SPWLA is an endorsing society of the 2022 International Geomechanics Symposium (IGS). This event takes place in Abu Dhabi, UAE, on November 7–10, 2022, and is hosted by ARMA, DGS Dhahran, and SEG. This is an excellent example of sister societies cooperating for the greater good of the science discipline. The "Best of SPWLA 2022" will be represented by the following paper:

- **SPWLA-2022-0017:** "A New Method of Integrating Rock Physics and Geomechanics for Simulating Deformable and Permeable Behavior of Tight Carbonate for Optimized Reservoir Development;" Umesh Prasad, Amer Hanif, and Pranjal K. Bhatt, Baker Hughes; Hayat Abdi Ibrahim Jibar, Karem Alejandra Khan, and Andi Ahmad Salahuddin, ADNOC Onshore.

In addition, I will be chairing a session and taking part in a "President's Panel," where we will discuss the energy transition and challenges for both membership and diversity, equity, and inclusion.

There are two important Special Interest Group events happening in person this fall/autumn in Houston. First, "Borehole Acoustics: The Road Ahead" is a workshop devoted to all aspects of borehole acoustics, which takes place on September 2 at the Chevron Auditorium in downtown Houston. The second event is a two-day NMR SIG Conference that will be held at the Halliburton Main Campus on October 6–7. The meeting is entitled: "Spinning Up an NMR Conference After a Two-Year Relaxation Time." More information about both events can be found on the website.

I am really pleased to announce that we have formed a Diversity, Equity, and Inclusion (DE&I) Committee. Chaired by Julie Rowlands of Noesii Limited, it is being set up to educate and elevate awareness of diversity, equity, and inclusion within SPWLA and create a welcoming environment for all. The DE&I committee is interested in hearing from any member who would like to actively contribute. Please email dei@spwla.org with your thoughts and suggestions. Full details will be available in our next issue of *SPWLA Today*.

This is that time of year when the BoD members recover from the last symposium, enjoy some well-earned family vacation time, and then start work on their SPWLA commitments for the year. For my part, I have begun working on a number of items that will not be realized for several months.

First, working with **Iulian Hulea** and **Robert Gales**, we have defined the requirements for some minor enhancements to the Abstract Submission process. We have been using the same abstract submission software for the last 5 years, and hopefully,

you have found it easier to navigate than the time before. Last year, we decided to go with an Extended Abstract format, which, unfortunately, caused confusion for some. We are hoping that we have streamlined this process for 2023.

Secondly, please check out spwlaworld.org, as we have updated it with the latest news for SPWLA 2023. It's always a work in progress.

Finally, we have also begun work on establishing the feasibility of merging spwla.org and spwlaworld.org into one modern website. I am not going to say too much about this at this point beyond the IT Committee has created a platform to evaluate some new membership software products that integrate with our abstract submission software. More details should be available in the next issue of *SPWLA Today*.

As a reminder to everyone, the **2023 SPWLA Symposium** will be held at **Margaritaville Lake Resort** in **Lake Conroe**, **Texas**, **USA**, on **June 10–14, 2023**, and will be hosted by the **SPWLA Houston Chapter**. As well as being a North American Regional Director, **Javier Miranda** is also the Chair of the Organizing Committee for SPWLA 2023. Currently, he is selecting his Committee, and if you are interested in joining, please contact him at director-na1@spwla.org. Here is an aerial view of the 2023 symposium headquarters:

What will this year look like for SPWLA? Well, we will continue our focus on education. We plan to add additional courses and make them more accessible at times that suit all our members.

We will continue to focus on making SPWLA a more international organization. I am planning on visiting as many chapters as possible over the coming year, so please let me know if you are planning an event and have room for one more attendee.

We all recognize that our industry is changing, and it is SPWLA's responsibility to prepare its members for it. We will continue to educate our membership on alternative subsurface and energy transition without neglecting our more traditional disciplines. The positive feedback from the **Subsurface Sequestration and Storage of Nuclear Waste and Carbon Dioxide** workshop has been immense, and we will continue to build from there.

Finally, SPWLA is diverse and inclusive. We are committed to changing attitudes and encouraging participation from diverse communities. The creation of a DE&I committee dedicated to this is only the start. If you have any ideas or would like to get involved, please email dei@spwla.org.

Mae adfyd yn dwyn gwybodaeth, a doethineb gwybodaeth./
Adversity brings knowledge, and knowledge wisdom.

Kind regards,
Tegwyn JP Perkins
+1 (713) 670-4976
President 2022–2023
President@spwla.org

From the Editor

Stephanie Ellen Perry
2022–2023
Vice President Publications

Greetings, community of colleagues! We hope everyone is well and thriving, as we are about halfway through 2022 already. Going into the second half of the year, there are a lot of exciting opportunities the organization has planned and upcoming. I'm looking forward to a number of SIG-focused fall symposiums, training opportunities, the golf tournament, and much more as we all strive to foster our technical and social capabilities and needs. I hope you enjoy the news, goings-on, and reflections of our peers.

Above all else, I'd like to thank all of the individuals who continuously contribute in volunteer roles, no matter how much is asked of them. Without all of you and your contributions and tireless support, our community wouldn't be as informed and cohesive. So, thank you for your *SPWLA Today* efforts and contributions. Keep them coming! If anyone has an interest in contributing content, please don't hesitate to reach out and ask!

Kindest regards and well wishes,
Stephanie Perry
Vice President Publications

Kelly Skuce
2022–2024 Vice President
Education

Hello SPWLA Colleagues,

It has been a very busy summer with discussions, collating votes, and deliberations with Carlos Torres-Verdin (SPWLA VP Tech, 2021) and Stephanie Perry (VP Publications, 2022). We are pleased to announce the list of Distinguished Speakers from the 2022 SPWLA Symposium in Stavanger for 2022–2023. The list for Global Distinguished Speakers is still being compiled and sent in by our Regional Directors and should be out before the next issue of *SPWLA Today*.

2022–2023 Distinguished Speakers

SPWLA Paper	Name	Title
SPWLA-2022-0011	Brian C. Seabrook	Comparison of Raman, Brillouin, and Rayleigh Distributed Temperature Measurements in High Rate Wells
SPWLA-2022-0012	Olga Podgornova	Full Waveform Inversion of Fiber-Optic VSP Data From Deviated Wells
SPWLA-2022-0045	Supriya Sinha	Past, Present, and Future Applications of Ultradeep Directional Resistivity Measurements: A Case History From the Norwegian Continental Shelf
SPWLA-2022-0046	John Bergeron	UDAR: Past, Present, and Future. An Operator's Experience and Perspective on the Challenges and Opportunities in Applications With Ultradeep Resistivity Tools
SPWLA-2022-0047	Frank Antonsen	What Next After a Decade With Significant Advances in the Application of Deep Directional Measurements?
SPWLA-2022-0070	Vanessa Simoes	Deep Learning for Multiwell Automatic Log Correction
SPWLA-2022-0071	Mustafa Al Ibrahim	Uncertainty in Automated Well-Log Correlation Using Stochastic Dynamic Time Warping
SPWLA-2022-0072	Isa Silveira de Araujo	Quantifying Interfacial Interactions Between Minerals and Reservoir/Fracturing Fluids
SPWLA-2022-0090	Marco Pirrone	CCUS in Mature Fields: How Core-to-Log Data-Driven Analytics Enhances Mechanistic Models for the Purpose of Reservoir and Caprock Mineralogical Characterization
SPWLA-2022-0099	Xiao-Ming Tang	Fracture Characterization Combining Borehole Acoustic Reflection Imaging and Geomechanical Analyses
SPWLA-2022-0109	Muhammad Nur Ali Akbar	Naturally Fractured Carbonate Reservoir Characterization: A Case Study of a Mature High Pour Point Oil Field in Hungary
SPWLA-2022-0129	Laura Lima Angelo dos Santos	Unsupervised Facies Pattern Recognition of Brazilian Presalt Carbonate Borehole Images

Please contact the speaker, me, your Regional Director, or the SPWLA office if you want any speakers to attend your event in person or virtually if they cannot travel.

The SPWLA also has several events upcoming in the fall. First, we have the **Borehole Acoustics Workshop** from the Acoustics SIG on September 2, 2022. Check out the Acoustics SIG webpage or www.spwla.org for more details.

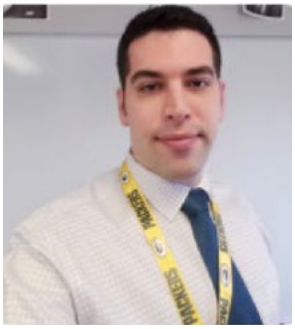
Secondly, there will also be the Fall Topical Conference from the NMR SIG: "**Spinning Up an NMR Conference After a Two-Year Relaxation Time"** on October 6–7, 2022, at the Halliburton Campus in Houston. Check out the NMR SIG webpage for full details or www.spwla.org.

Please see the table below for upcoming courses and register at www.spwla.org to attend.

Petrophysical Multimineral Analysis	Patricia E. Rodrigues, PhD	OCT 25–26
NMR Fundamentals and Overview of Advanced Interpretations	Brian Stambaugh	SEP 12–14
Practical Seismic Petrophysics	Tad Smith and Matt Blyth	NOV 1–3
Practical Geomechanics	Tom Bratton, PhD	TBD
Casedhole Petrophysics	Ahmed Badruzzaman and Dale Fitz	TBD
Acoustic Class	Adam Donald and Matt Blyth	TBD
Cement Bond Log Analysis	Gary Frisch	TBD

There will be more courses from the SPWLA starting again in the fall. Some are scheduled already, and others need confirmation and scheduling. Please email me at vp-education@spwla.org if you are thinking of an idea for a course and want to find out if we think the same!

Keep on learning,
Kelly Skuce
VP Education, 2022–2024



Adam Haecker
2021–2023 VP Finance, Secretary, and Administration

Hello, Intrepid Petrophysicists,

We are still counting the receipts from the symposium, sadly. I had hoped to share a profit and loss statement with the community, but because it was international, some transactions are taking longer to close than expected. Stay tuned for the next issue of *SPWLA Today* for a solid accounting of how the society did in Stavanger.

That being said, the values we have so far look extremely promising. The venue was excellent and surprisingly economical. We had strong local sponsorship from some excellent companies. The workshops had high participation numbers, and finally, our exhibition hall sold out in the spring. I think you will be pleasantly surprised by the news when it has finally cleared all the accounting hurdles.

In the USA, there is some exciting news for the petrophysical community. The Biden administration is going to pass the Inflation Reduction Act. It passed the House today and is on the way to the resolute desk. This will hopefully spur more activity in CCUS and green energy, in addition to oil and gas, mining, and other sectors.

Petrophysics is vital to any CCUS endeavor. Who else is better equipped to determine the storage, permeability, seal integrity, rock mechanical properties, pressure testing, and core analysis needed to meet the stringent EPA requirements? Only petrophysicists, in my opinion. To paraphrase Hilbert, who once remarked about Einstein, "This is too important to be left to the [engineers]."

I often use this quote for students. It is from G.E. Dawson Groves in his excellent paper from 1980 about how petrophysics is like a spider in the web. Here is a download LINK if you want to check it out.

"Modern sophisticated petrophysics has a part to play in petroleum exploration, production, and reservoir development, the ultimate importance of which is as yet undreamed of. In this total endeavor, the petrophysicist occupies a vital, central, potentially controlling position. He is, in fact, like a spider in his web. The petrophysicist has an important part to play in both exploration and production. His range of interest, the range over which he can make very significant contributions, is wider than that of any other discipline involved." -G.E. Dawson Groves, 1980

Until next time,
Adam Haecker
VP of Finance, Secretary and Administration

Mathilde Luycx
2021–2023 VP Social Media

Dear SPWLA Colleagues,

I am **excited to continue in my second year as VP Social Media**. This past year was the first time the VP Social Media (VP SoMed!) position existed for the SPWLA board of directors. It was a year of developing the position, understanding what it meant for our organization, and how it could be used to best serve the SPWLA membership. In the past year, the team has introduced tools to improve the effectiveness of the SPWLA's communication on its social media channels. If you want to use Buffer and Canva for your local chapter and/or SIG, we wrote a quick tutorial in the *SPWLA Today* Newsletter of March 2022 (note that they are free for nonprofit organizations). We also launched an SPWLA Instagram page whose following has been steadily increasing over the last 8 months.

This coming year, my goals for the position will continue in the same direction as last year. My main commitment **remains to deliver a daily engagement by continuing to report the news of our organization and its activities timely and diligently**. A few specific goals of mine for the coming year are: (1) to create LinkedIn events more systematically for the annual symposium, the topical conferences, and the Distinguished Speaker talks, (2) to increase video content both on the SPWLA YouTube Channel and on Instagram, and (3) to introduce a local chapter highlight on our social media pages every other month.

With these objectives in mind, the Linkedin events for the annual symposium **#spwla2023** in Lake Conroe, Texas, the fall topical conference **#spwlatopical**, and the *new* SPWLA Golf Tournament **#spwlagolf** are up. Visit them for more information on these **#spwlaevents**! You can also watch #spwla.

We will also share an **"SPWLA Communication Survey" around September 15**. Our goal is to understand your preferred communication platform and learn the type of news you are most interested in. The survey will have five questions plus an opportunity to leave suggestions; it takes less than 2 minutes to answer (we timed it!), **so let your voice be heard!**

#spwla2023

#spwlagolf

Lastly, I would like to **welcome the 2022–2023 SPWLA Social Media Committee members**. The team will work together to maintain and feed the SPWLA social media pages in the coming year. I am very grateful for their commitment. The team is composed of student members and young professional volunteers with diverse backgrounds and experiences. They will introduce themselves below!

Joshua Bautista Anguiano (Mexico) has a PhD in petrophysics and is a former officer of the SPWLA Student Chapter at The University of Texas at Austin, currently living in Mexico City. "I'm a former geophysicist who turned to the darker arts of petrophysics; also, I'm a part-time gardener and clockmaker."

Jorge De Los Rios (Argentina)
"Hello, dear friends and colleagues from the oil & gas industry! I am very grateful and proud to lead the first Argentina Student Chapter. As an advanced petroleum engineering student, the experience of working with geologists, petrophysicists, and well-log analysts is very enriching. Let's work together as a team!"

Tanya Garavito Luque (Colombia)
"Hello, my name is Tanya Garavito Luque. I am a recent graduate in petroleum engineering. I am fascinated by my career. I like to do sports and really enjoyed being part of the SPWLA UIS Student Chapter as a treasurer. Currently, I belong to the SPWLA Colombia professional chapter and serve on the marketing committee. I have now started some fantastic work with the SPWLA Social Media Committee."

Judah Odiachi (USA)
Hello, everyone! I am Judah Odiachi, a petroleum engineering (MSc) graduate from the University of Oklahoma (OU), where I was a two-time SPWLA ISPC winner and served as the VP of the SPWLA OU Student Chapter. I am currently working professionally as a data scientist, and I look forward to being a member of the 2022–2023 SPWLA Social Media Committee.

Melissa Ramirez (Abu Dhabi)
"Hello, everyone! I'm Melissa Ramirez, a petroleum engineer currently working in Abu Dhabi as a project engineer. I'm a former vice president of the American University of Ras Al Khaimah SPWLA Student Chapter. I have been part of the SPWLA Dubai Chapter as a secretary for the last 2 years. I'm looking forward to being a part of the SPWLA Social Media Committee 2022–2023."

Luis Miguel Salas Chia (Colombia)
"Hello! I'm Luis Miguel, a petroleum engineer and hydrocarbon engineering master's student from the Universidad Industrial de Santander. I'm also a former president and current advisor of the SPWLA UIS Student Chapter. I like to be involved in research and have experience related to EOR methods and hybrid techniques."

Mathilde Luycx
Vice President Social Media
(+1) 512-775-0815
VP-SocialMedia@spwla.org

Javier Miranda
2022–2024 North America 1
Regional Director

As I flew back to Houston from Aruba after visiting my family there, I could not stop thinking about a message I read on a "Blue Marlins" poster. Blue Marlins (@BlueMarlinsBaseball) is a baseball organization situated in Noord, Aruba, starting from age 5 to adulthood. Its mission is "Creating better men for the community." Their organization is maintained by the energy of enthusiastic and dedicated volunteers who invest their free time in creating an educational environment to develop and nurture athletic talents and stimulate competitive spirit through sportsmanship and teamwork. What I read on my cousin's home poster represents exactly what I feel as an SPWLA volunteer, and I am pretty sure it also represents others around our society: **"Volunteers do not necessarily have the time; they have the heart."**

I am pleased to see more of these volunteers around, but we still need more of them to carry out our profession and society's development and future. We need to nurture talented petrophysicists and stimulate new ideas and ways to contribute to our professional society and the world around us.

The pandemic impacted our lives in so many ways. It separated families for months or even years. I am happy to see that changing rapidly with more colleagues visiting their relatives after so much time. On that note, I want to see higher attendance at our events. The professional and student chapters across North America are doing as much as possible to prepare excellent events to attract our members. I encourage you to attend and participate in their networking events. For example, the Houston Chapter recently hosted a networking event (see picture below) at BierHaus. They will also host a seminar on the north side of town for the first time in almost three years. It will be a seminar followed by a tour of the Stratum Reservoir labs. They have kindly offered their facilities to host this lunch seminar named "Solving CO_2 Sequestration Challenges." Please register on the Houston Chapter website if interested. I plan to attend! The SPWLA University of Houston Student Chapter leadership is also working tirelessly to bring some interesting events to their members, such as bowling with professionals and a company tour for students (they are currently looking for a company; please contact Ajibola Samo if interested). These are in addition to their regular events, such as technical seminars with SPWLA DS as well as other chapter activities.

On a personal note, I recently became a US citizen. After living in this great country for more than 13 years, 11 of them uninterrupted, I am happy to officially call it my home as I have felt that way since long ago. I truly value how the United States of America and its people opened their doors to us and made us feel a part of the community. I also appreciate the opportunity to serve this country and region, and what better time to be a local citizen than now representing the North America region for our society.

Regional Understandings–North America 1

Preparations continue as planned for the annual symposium in Margaritaville Resort at Lake Conroe, Texas, on June 10–14, 2023. Please look at our promotional video in the link below if you have not. Elliott, my 14-year-old son, helped me prepare it: https://www.youtube.com/watch?v=bYH-DBgsH6M

Iulian, Bob, and our technology committee continue working tirelessly to offer us an excellent technical program. Our organizational committee is almost assembled to provide you with what promises to be a great symposium with high attendance, so make your plans. The call for proposals for special sessions was open until August 15. A kickoff meeting for the organizational committee is happening in early fall. More announcements about the symposium will be posted on the SPWLA website, so stay tuned for new information.

I am also interested in reactivating the Dallas Chapter. I have contacted past members and other people in the area without response. If you live in the great Dallas metro area and are interested in reactivating the chapter, please contact me.

I plan to continue collaborating with local chapters to support their initiatives, as well as with those companies and members who want to keep participating in our activities. Remember that local chapters are the foundation of our society! Feel free to reach me at my official email address below for any recommendations, ideas, questions, etc.

My best wishes to all our members, especially in my region, as the fall season starts!

Javier Miranda
North America Region 1 Regional Director
Director-NA1@spwla.org

Eva Gerick
2021–2023 Europe
Regional Director

Dear SPWLA Community,

This month, I'd like to feature our up-and-coming European Chapter in Romania CEFES (Central European Formation Evaluation Society). Zoriana Snovida has currently taken the reins to lead the chapter's activities, and we had a great chat yesterday about her vision and enthusiasm to grow the CEFES community in the future. So, if you're in the Eastern European region and are interested in joining the community, please do get in touch with either me or zsnovida@slb.com. Also, check out the CEFES Facebook website for in-person and online events: https://www.facebook.com/cefesromania/.

I'll leave you with a few words from her.

"Dear members of SPWLA!

We would like to thank you all for the continued support of the CEFES Chapter. We had the pleasure to host David Allen, SPWLA Distinguished Lecturer, in Bucharest in May, where he delivered his talk on "Challenges and Solutions of Low-Resistivity Pay." We enjoyed this in-person gathering, meeting new people, and catching up with old friends and colleagues. The event received great feedback. We are looking forward to resuming chapter activities after the summer break. Please feel free to get in touch."

All the best,
Eva Gerick
Europe Regional Director
Director-Europe@spwla.org

Regional Understandings–Middle East/Africa

Jennifer Duarte
2022–2024
Middle East/Africa
Regional Director

Dear SPWLA Community,

Greetings from the UAE! I hope you enjoy reading the September 2022 issue of *SPWLA Today*. I also hope you had a great summer break.

In recent weeks, I have had the opportunity to connect with chapter leaders in the Middle East and Africa. I have been able to gather information about what is happening in local chapters, learn about their local activities, and hear about some of the challenges they face. Many of our chapters continue with virtual technical meetings; some have just resumed after the summer break. I would like to thank the chapter leaders who have met with me for your comments and input. It has been very positive for me to meet you and learn how each chapter, with their continuous efforts, continues to provide a sharing knowledge platform to our members through their technical talks and local events.

In the Middle East, the Dubai Chapter had its first technical talk after the summer break. The Saudi Arabia Chapter celebrated its fifth anniversary on August 3. This was the first hybrid event the chapter held post-COVID. Tegwyn Perkins (SPWLA President) and I were honored to be invited to join this celebration and deliver our congratulatory speeches on their fifth anniversary. SPWLA SAC, congratulations again on your fifth anniversary! I am personally looking forward to witnessing the continued achievement of the chapter.

In Africa, I have had discussions with the Nigeria Chapter about ways to promote their local activities. If you are in Nigeria and would like to be part of the local committee, please feel free to get in touch for more information.

All the best,

Thank you, Gracias, Shukran,
Jennifer Duarte
SPWLA Middle East and Africa
Regional Director 2022–2024

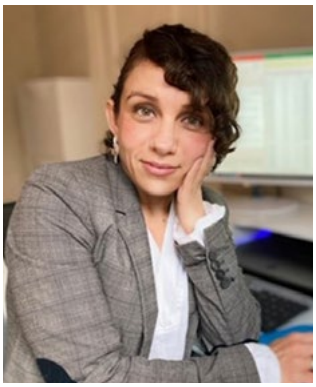
SPWLA Young Professionals Newsletter

the bridge

PhD Women in STEM

by Clara Palencia

September 2022



Clara Palencia

This article could start by saying that women have been underrepresented in STEM (science, technology, engineering, and mathematics) university courses, degrees, and occupations for many years. And yes, it is true, but there is no point in highlighting that anymore. Society needs to move forward, and things are changing fast. Every day, more women are studying for these types of careers, and even more are dreaming of getting a doctorate. A PhD degree is the culmination of many things, including the dreams of a complete family, a dream dreamed so many nights, a proof that hard work, resilience, and, to be honest, stubbornness can work together and get you anywhere you really want. But it is also the starting line for a new race where possibilities are unlimited, and freedom is real. Three women from three different countries agreed to tell their experiences with how a PhD changed their life and how it opened their minds to an infinite world of options in terms of career choices, live projects, ideas, and wonderful opportunities to help society.

Dr. Lara E. Heister (USA) is a geochemist holding two BA degrees, an MSc degree, and PhD in geoscience with over 25 years of combined academic and industry experience. She is currently a distinguished advisor to This Is Petroleum Systems consulting and Director of Elevation Geochemistry. Dr. Irene Arango received her doctorate in geology with an emphasis in geochemistry from Indiana University (2006), a master's degree in geology (minor in biology) from Indiana State University (2002), and an undergraduate degree in geology from the National University of Colombia (1998). Since 2006, she has worked at Chevron as a geochemistry subject matter expert (SME) on the exploration and development of conventional and unconventional plays worldwide. She is currently the Gulf of Mexico Business Unit's Hydrocarbon Charge SME for Chevron. Dr. Yuqian (Philomena) Gan holds a PhD in stratigraphy and sedimentology from The University of Texas at Austin, a master's degree in earth sciences, and a bachelor's degree in geology from the University of Oxford. Since 2013, she has had multiple internships, including Shell and Eriksfiord, which she joined full time in 2022. Let's listen to them and enjoy their words while discovering the feelings behind them.

What motivated you to pursue a PhD in STEM?

Dr. Lara Heister: Some of the best advice that I was given as a young scientist was to study what I was passionate and excited about (vs. trying to chase the market, as it is ALWAYS changing) and that my experiences that I learned while becoming a solid scientist would be enough to find employment. Well, they were right. And for my PhD, after finishing my master's degree, I was very motivated. Stanford offered me the chance to fly around in a helicopter and hike and climb around Greenland, so I jumped at the chance to join their PhD program. Everything that I learned about oil and gas came from training (formal and on the job) that I learned at various companies that took a chance on a woman who knew a lot about volcanoes and magma, and for that, I will always be grateful.

Dr. Irene Arango: I wanted to do a PhD because I wanted to dig deeper into topics that I was passionate about. While I had some oil industry experience before starting my graduate studies, my PhD work was actually not oil oriented. I did a study focused on the use of isotope geochemistry tools for the identification of signatures of life in extreme environments. The study was sponsored by the NASA Astrobiology Institute as part of the initiative "Life at the Edge of Hydration."

Dr. Yuqian Gan: It's half chance, half choice. When I finished my master's, I wanted to start working in the industry. At the same time, I also felt that I hadn't had enough school time and wanted to have more opportunities to figure out if there was a topic that I was really interested in. In the end, my PhD offer came before my job offer, so I became a graduate student again.

How was the experience in general? What are the things you most liked and the things you struggled with the most?

Dr. Lara Heister: My PhD experience spanned two universities, and the decision to leave the first one was a very difficult one. However, I decided that I wasn't content with my perceived job prospects where I started my PhD. And because those are so critical to earning many interviews and positions, I decided that it was best for me to transfer to finish my degree elsewhere. However, the experiences and relationships that I developed at both universities allowed me to become a very well-rounded scientist with a vast network of colleagues, which I value very much. I also appreciated the freedom from my advisors to explore many different topics and to craft the scope of my dissertation, which was broad in nature.

Dr. Irene Arango: The time I spent doing my PhD is some of the most treasured times of my adult life. Being immersed in an intellectual, motivating, and challenging environment, sharing time and effort with like-minded colleagues, learning from accomplished professors, and experiencing life in a wonderful university town made this time memorable. That is not to say that there weren't any challenges. It is a commitment that requires dedication and sacrifice. My research work involved laboratory experimentation, which was very time-consuming and required the use of chemical compounds that needed careful handling and safety training. Getting to the finish line required determination and the willingness to go the extra mile.

Dr. Yuqian Gan: The experience, in general, was fantastic. There are so many things and experiences that I absolutely loved. The thing I like the most about a PhD is the freedom. You have the freedom to explore any topic you like and investigate any problem you are interested in. That said, it was easy for me to get lost in a sea of knowledge and just keep reading papers but not getting anything done, which was really a struggle for me. So, I tried to set schedules for myself. In the later years of my PhD, I became better at not being a perfectionist but doing my best within a reasonable timeframe, so I get to enjoy the knowledge-sucking progress and still reach my conclusions.

Another thing I really like, which could be school-specific, is the career and networking opportunities that my PhD program was able to provide with its close vicinity to the USA energy hub of Houston. I attended many seminars, symposiums, conferences, and networking events to improve my communication skills and broaden my knowledge of the field. The industry has been very understanding and active in promoting activities among students as well. They sponsor student chapters, such as SPWLA and AAPG, and provide funding for travel. At the beginning of the pandemic, I was very sad to see events get canceled, but academia and the industry responded quickly to the changing environment, and in fact, the accessibility of information has been greatly improved with virtual technology. I was traveling less but attending more events.

How do you think your PhD contributes to your professional and personal success?

Dr. Lara Heister: I think the confidence that I gained in myself, knowing that I can "figure almost anything out," which I learned through my PhD, was invaluable and has contributed to my success. I'm not intimidated by a new basin, tool, or measurement that I need to understand to do my job or help my clients. This attitude also comes in pretty handy when something breaks around the house.

Dr. Irene Arango: The methods and techniques that I used for my research work were all applicable and relevant for petroleum geochemistry applications. I was able to apply those learnings to my work as a hydrocarbon charge specialist. My studies provided me with the skillset needed to do quality work. Also, the learning habits developed during those years and previous years in academia helped me grow as a researcher and fulfill my personal need for knowledge.

Dr. Yuqian Gan: The short question is: everything? Haha. Of course, you get all the professional and technical knowledge through a PhD. At the same time, you also have a long time period to prepare for your professional career, in particular through networking. Personally, well, I got a doctor title. And I got transferable skills. As I will talk more in detail for the next question, time management and resilience are really, I think, the most valuable things you can learn for the rest of your life.

Besides the knowledge on your specific topic, what other abilities and knowledge do you think you gained while doing your PhD?

Dr. Lara Heister: I think I became a very good multitasker and became confident that I, with a bit of effort, could understand topics and ideas that were new and foreign to me. I also believe that I have become a better communicator and can tear about problems in a systematic way. Also, I taught a good deal during my PhD (which I didn't realize I would enjoy but did very much). Being able to communicate your ideas or findings clearly is incredibly critical in any field, including the oil industry or any industry for that matter.

Dr. Irene Arango: In addition to providing me with the skills necessary to do my work, doing the PhD helped me grow as a researcher, taught me analytical skills, and how to evaluate complex problems and design fit-for-purpose research programs.

Dr. Yuqian Gan: A PhD is a long time where you can pretty much study anything you like and develop many hobbies. The most important ability I'd say is "problem solving." It sounds a bit cliche, but when you think about it, it is a very serious task. When you have a big question, the answer is not there immediately. You need to know how to break the large question down into smaller, progressive questions that will lead to the ultimate answer. For each question, you need to develop a methodology. If successful, what's the next step? If a step fails, what's the alternative? So, it asks for your logical thinking there. The way of thinking you are trained by your PhD is beneficial for your work and life. Linking back to my answer to the second question, when you have such a long project with an enduring task, it's important to keep a steady head and know what you are capable of and what is beyond your limit. People get depressed during their PhD due to the pressure. It's often not possible to solve questions all by oneself. Push yourself to build up your resilience, but don't push yourself too hard. When you need collaboration, when you need help, ask for it.

What would you say to the women who are thinking about pursuing a PhD in the oil industry?

Dr. Lara Heister: I would say go for it! If you have the passion and support to dive deeper into a topic and create new science (industry related or not), then do it. You have many years to carve out and cultivate a specific career, and if you can, try not to rush to the finish line. The journey is worth savoring. And be a lifelong learner. Don't be complacent, and try to integrate as many tools, ideas, and people into your dissertation, as even the most apparently esoteric topics change the way you think and see the world.

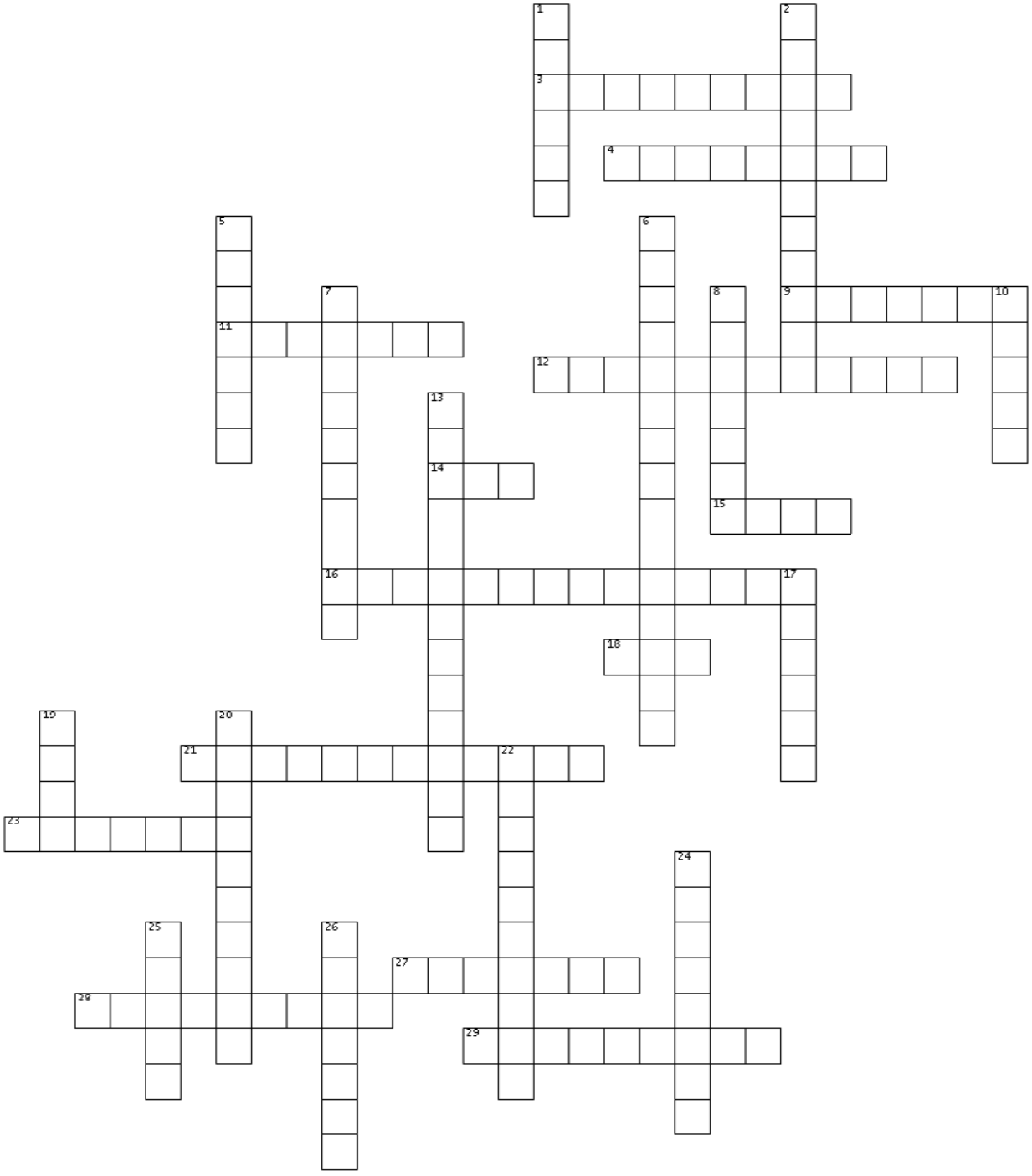
Dr. Irene Arango: Today, more than ever, energy companies actively search for women in STEM to bring their knowledge and diversity to the work environment. Pursuing a PhD requires sacrifice, commitment, and dedication, opening doors to excellent employment opportunities and career goals. Regardless of the specific research topic that you work on, oil companies value above all the critical thinking and analytical skills that are developed and solidified as part of the work required to obtain an advanced degree.

Dr. Yuqian Gan: I don't feel there is any advice that I need to give to women, specifically in the oil industry. I may be privileged, but I personally have never felt a woman is treated differently in my past experiences. However, now working for the oil industry, I do see an underrepresentation of women at management levels, more for historical reasons. I believe this will improve with time. Now, there are more women like me joining the oil industry, feeling they are encouraged to pursue their dreams, whatever they may be.

Still, I do have some advice for people thinking of pursuing a PhD. Retrospectively, I would put more thought into my career plan before joining a PhD program. One thing I notice when looking for jobs is that a PhD title can sometimes limit your choices. Most jobs only need a bachelor's or master's degree (which is more common nowadays). With a PhD title, you can be limited to bigger companies that can afford to pay a PhD-level salary or more specialized companies that may not be your ideal career path if you want to be an all-arounder. That said, there are not that many PhDs out there, so the title helps, and the knowledge and the transferable skills you gain are yours forever. I'm glad to see that nowadays, there are more options for how you get a PhD degree.

Although every person has a reason to pursue a PhD degree, and every experience is different, in the end when the mission is accomplished, the feeling of gratification, happiness, and thankfulness is overwhelming, and it will be yours forever. It will inspire you every day and push you to do things that you never thought you could, as well as inspire others to go further. It is a lifetime experience with wonderful memories that you can look back at any time and find the strength when you need it the most.

CROSSWORD PUZZLE



ACROSS
3. The amount of displacement of a seismic wavelet measured from peak to trough
4. A device used in surface seismic acquisition to detect seismic wave velocity
9. Pertaining to the environment and conditions of organisms living at the water bottom
11. A percentage share of production paid from a producing well
12. Describing rocks or sediments containing particles that are silt or clay sized
14. Net present value
15. Lithified volcanic ash
16. A graphical representation of concentrations in a system with three components
18. An estimate of the total amount of oil contained in a reservoir
21. The ability of a material to store a charge from an applied electrical field without conducting electricity
23. A line on a map that represents a constant value of the parameter being mapped
27. Global sea level variations
28. A statistical function that describes the correlation or continuity between sample values
29. A set of equations that describes the partitioning of energy in a wavefield relative to its angle of incidence at a boundary

DOWN
1. A relatively low-standing fault block bounded by opposing normal faults
2. Pertaining to a repulsion of water by the surface of a material or a molecule
5. CCUS - Carbon Capture Utilization and
6. Ratio of density of a material to that of water
7. Radial distance from the wellbore to the outer tip of a fracture
8. A well drilled in an unproven area
10. A general term for unrefined petroleum
13. A geological surface that separates younger overlying sedimentary strata and represents a large gap in the geologic record
17. Midpoint of a frequency distribution
19. Short name for floating production storage and offloading vessel
20. The coefficient representing goodness of fit
22. The process of absorbing a wetting phase into a porous rock
24. Description of the roughness of a borehole wall
25. Topography formed in areas of widespread carbonate rocks through dissolution
26. Oil that contains no dissolved gas

Unjustified Logging Depth Shifts of Original Fluid Contacts Lead to Abandonment of Giant Oil Field[1]

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ABSTRACT

At the end of an integrated study for a new field development plan (FDP), the original fluid contacts (OFCs) in a giant oil field, used for the reservoir simulation and production forecast, appeared to be incorrect. Also, interpretation of (i) micrologs and (ii) deep resistivity logs in the 30 m thick, clean sandstone reservoir, with 30% porosity and several Darcy permeability, was problematic, and (iii) the distribution of wax in the field was still unexplained.

To establish the proper OFCs, those three other problems had to be addressed in parallel. Rigorously following the fundamental difference between free-water level (FWL) and oil-water contact (OWC) and considering the effects of the structural geological history of the field, with post-charge tilting and faulting, were key in finding a solution. In that final solution, the OFCs changed as much as 25 m, up and down. The consequence on stock tank oil originally in place (STOIIP) was less than 10%, but the impact on the history match and hence the confidence in the production forecast and FDP was dramatic. Without a solid FDP and for lack of economic production, the field had to be abandoned, with some 75% of the STOIIP still in the ground. This is classified as a Category 4 mishap, the most severe category in a classification of possible mishaps from petrophysical interpretation errors.

The erroneous OFCs used in the FDP, the root cause of that Category 4 mishap, came from an earlier study that erroneously concluded that many wireline-logging depths had to be shifted. This is called a Type 2 depth error. The logging depths were correct but were believed to be wrong, and some 75% of the logs' crossing fluid contacts were to be depth shifted, in order to line up the observed contacts with a belief of those having to lie on a horizontal plane.

One of the most powerful messages from this case study is that OFCs are for an FDP what O-rings of solid rocket boosters are for a space shuttle, tiny little rings around a large structure, well understood only by some specialists. However, any serious problem with those O-rings or OFCs may lead to disaster[1].

INTRODUCTION

Similar to the way in which traffic accidents are categorized in a pyramid with several classes of increasing severity and reducing frequency, mishaps from petrophysical activities are classified in four severity classes (see Fig. 1, Loermans, 2014). Just as we learn from car accidents to improve traffic safety, in petroleum engineering, we may learn at least as much from mishaps, if and when properly analyzed and documented, as from smoothly run and successfully completed projects.

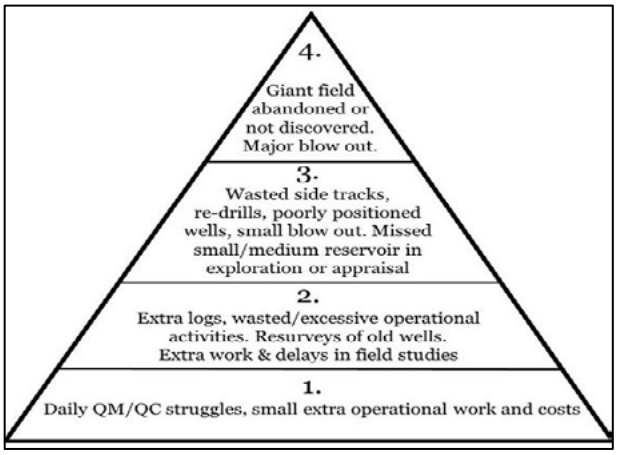


Fig. 1—The pp mishaps pyramid.

Logging depth errors can be classified into two types (Bolt et al., 1999). In Type 1, there is an error in the depth itself. Unless it is discovered and corrected, that error percolates further into evaluations, with obvious potential risks for wrong reservoir models and business decisions. In a Type 2 depth error, there is nothing wrong with the depth itself, but it is believed to be wrong and then "corrected," and the logs are shifted but actually falsified. Thus, an incorrect depth goes into the subsequent evaluations, with at least the same risks as a Type 1 error.

[1] Some main elements of this paper were presented first in the 1999 SPWLA annual conference (Loermans, 1999). Since then, further presentations were given for a score of professional organizations around the world. Because depth matters still matter, this paper now augments the 1999 paper with illustrations and also serves to document key learning points beyond the initial scope.

This case study involves a Category 4 mishap, a giant field being abandoned, resulting from a Type 2 depth error, unjustified depth shifts of the original fluid contacts. That Type 2 error was initially made in a small petrophysical review but carried forward in the company's official systems and a few years later into a major field study and FDP. The basis of that FDP was thus flawed, and the ultimate result was the abandonment of that giant oil field after 40 years of production, with 75% of the STOIIP still in the ground.

FIELD CHARACTERISTICS

The giant field under study, at its prime time, the largest onshore oil field in the particular part of the continent it was in, had been in production for more than 40 years but had recovered still only some 25% of the STOIIP.

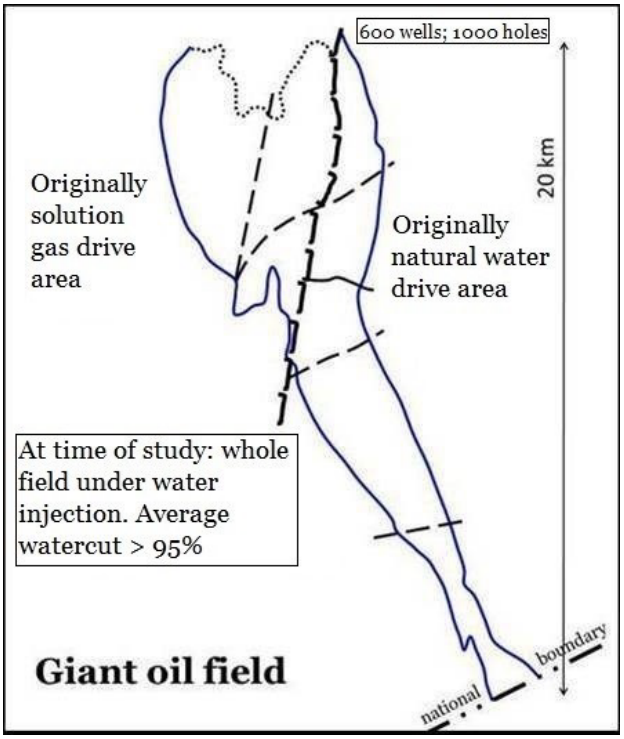


Fig. 2—Field outline.

See Fig. 2 for a map of the field and Fig. 3 for a typical well log. Note (i) the national border at "the end/bottom" of the field and (ii) the major fault separating and completely offsetting from each other, the original solution gas drive area and the part originally under natural water drive. The field is further subdivided, as indicated by the dashed lines, based on mostly non-sealing faults as interpreted early in the history of the field.

The reservoir, less than 1 km deep, hydrostatically pressured, and with a temperature on a normal geothermal gradient, is an unconsolidated sandstone, 30 m thick, 30% porosity (Fig. 3), and several Darcies(!) permeability.

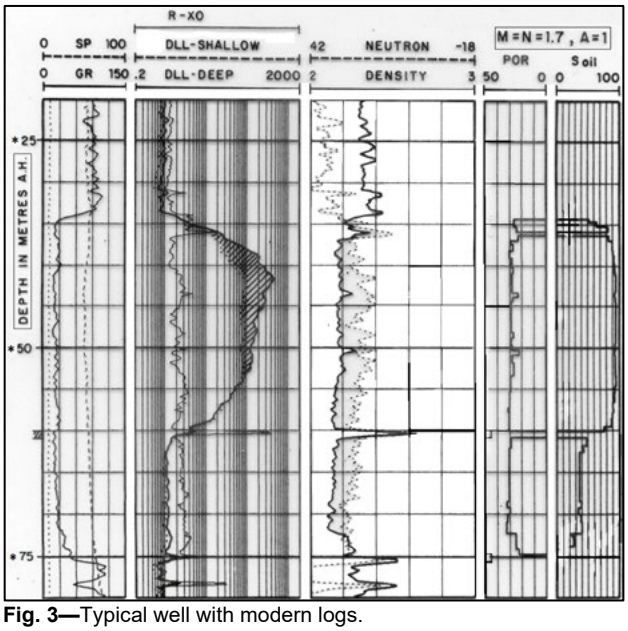


Fig. 3—Typical well with modern logs.

The oil produced, while not extremely heavy, is very viscous, 150 cP, and also waxy, at least in places. The formation water has a salinity of about 85-g/l NaCl equivalent around the contacts and a little higher, around 100-g/l NaCl equivalent in the original depletion drive area. The total water cut at the time of the FDP was well in excess of 95 %.

NEW FDP

With secondary production declining and the field becoming unprofitable, a new FDP had to be made. A multidisciplinary study team, with geologists/ geophysicists, petrophysicists, reservoir engineers, and production technologists, was set up and given a few years to come up with an economically viable plan. This was an old field, with many previous studies and different technology tests and experiments carried out, including even in-situ combustion. Also, through the years, obviously varying numbers of petroleum engineering staff had been working to study, operate, and monitor the field. With such complex history, it was right to allocate sufficient manpower to this project.

As expected, data gathering was the first mammoth task. Next to gathering the readily available data, searches were made for half-forgotten or mislaid

items. With changes in library and archiving systems, office and company headquarters' moves, and reorganizations through the years, such extra search efforts were necessary and paid off.

All logs were digitized, at least everything which was considered to be a log. All reports were put into an easy access and retrieval system. Very wisely, the objective was to gather "everything," rather than "only the things needed."

The available micrologs appeared to provide an excellent basis for an improved geological zonation. However, while the micrologs appeared very valuable for this new zonation, running micrologs in the field was abolished shortly after those tools were introduced in the industry, several decades before this FDP. The reason was that the petrophysical interpretation, in terms of a net/non-net reservoir, had turned out problematic. While micrologs in the rest of the world were the proverbial fool-proof tools, in this field, they just didn't seem to work at all. The net/non-net indications of the micrologs were proven to be false. So, when numerous trials and efforts to explain the microlog response all failed, these tools were, understandably, no longer run. The ones which had been run were not used because of this "micrologs don't work in this field" stigma. That stigma lasted until this FDP study found them very useful for correlating.

As part of this large integrated petroleum engineering (PE) project, an elaborate petrophysical study on some 50 key wells across the field was done. For a field spanning almost 50 years of resistivity tool development, a well could have just about any one of all of the resistivity tools ever commercially available in the logging industry. Hence an enormous effort had to be made to derive a consistent true formation resistivity from all these different vintage tools so that reliable and consistent saturations across the field could subsequently be calculated. Many other aspects, including core studies and capillary pressure curves, were also addressed. Another achievement not to be underestimated was a method developed to recognize and evaluate steamflooded wells. Since the resistivity of steam and oil are both near infinite, distinguishing between the two is not a trivial job[2].

Partly in parallel with those geological and petrophysical studies, a reservoir simulation was made with one of the best reservoir simulators in the industry. While such parallel work may be nice for integration and efficiency, as will become obvious further below, that might also have some drawbacks in using non-final and thus improper input data.

It was deemed that the petrophysical evaluation routine developed from the 50 key wells could be applied in a large batch process for the remaining more than 500 wells. Since that task was considered pure routine, three man-weeks were deemed adequate, calculated precisely down to the smallest subtasks, such as cutting plots and related filing work. From that mass crunching of wells, at most, a tiny little tweaking of the STOIIP numbers for the final FDP was expected. The history match and production forecast had been fixed already, and all further subsequent planning work was well underway.

The history match obtained was absolutely perfect. The one concern was that between the reservoir engineers in the study team and some of their colleagues in the larger reservoir engineering discipline in the company, there was heavy debate about whether or not some of the tuning parameters used to obtain the match were realistic. However, the excellent match obtained, and the undisputed input parameters, including the OFCs and excellent rock properties, seemed to leave no alternative, so the history match and subsequent production forecast were accepted, and the whole FDP was made on that basis. This new FDP called for hundreds of new wells in a low-pressure pattern steamflood, which also necessitated lowering the aquifer pressure. Documents and reports were written, reviews conducted, and the whole organization and company were gearing up towards commitment.

SALINITY GRADIENT IN THE AQUIFER – THE FLORIS EFFECT

The formation water salinity is an obvious major input parameter for saturation calculations from resistivity logs. The immediate questions, just as in any field review, included the following:

(i) Is the water salinity in the oil leg the same as that in the aquifer just below the contact?
(ii) Are there any areal variations in the salinity across the field? And if yes:
(iii) Are those variations caused by a still ongoing flow in the aquifer?

The salinity at deposition being that of seawater, a substantial additional amount of salt, from Fick diffusion, or complete flushing with the current-day

[2] The effectiveness of steam injection in this reservoir, leaving only an extremely low residual oil saturation, was confirmed by cores.

much saltier water must have happened. While in the large geological system, there is plenty of salt, the time available for such change, in geological terms, was limited; hence the possibility of the water in the oil leg being substantially lower than in the aquifer couldn't be put aside too easily. With some obvious possible consequences on the calculated saturation from resistivity logs and thus STOIIP, less saline water in the oil leg leads to lower oil saturations. Hence some specific new data gathering would help with that, and until then, a little larger uncertainty in saturations and STOIIP was to be taken into account. As mentioned, all geological model indications were that for the geologically recent past, the whole system was static, so there was no dynamic flow and variations because of that. For this FDP, though, the answer to a fourth important question could have had a significant economic impact:

(iv) What exactly is the salinity in the large aquifer, far away from the oil leg?

An important part of the FDP was a pressure depletion of the large aquifer, necessary for the low-pressure steamflood mentioned above. To achieve such lowering of the reservoir pressure, huge volumes of water would have to be pumped out of the aquifer. The compressibility of water, and hence the (enormous, CAPEX intensive, so very critical for the economics of the whole FDP) pumping installation required, depends on the salinity. While this dependency may be considered small in itself, it was relevant for the sizing of the pressure-depletion pumping facilities, hence, the need to accurately establish the salinity, including any variations therein, across the whole aquifer.

A salinity increasing from around 80- to 160-g/l NaCl equivalent over an 800-m depth range for the whole aquifer was available from the open literature. However, such a gradient in a structure that had been static for at least a few million years could not be explained. Even only Fick's law for diffusion can equalize an initial gradient over a couple of million years, and gravity alone didn't seem to be the likely sole, or even main, possible cause. Given the possible impact on the economics, such inability to explain the observed gradient carried serious risk; hence, the desire, possibly even need, to explain that observed gradient in a quantitative manner.

A possible conceptual solution was found in what was then named the Floris effect (Loermans, 1999)[3]. Given that the chemical potential of a solution is a function of concentration, pressure, and temperature, one may expect a salinity gradient rather than a constant value in a large aquifer. The Floris effect is thus defined as the salinity gradient naturally established in a static aquifer, without any dynamic/ convective flow but with a temperature gradient.

Part of the problem, however, was that no values for the chemical potential at the (high) salt concentrations present in this field were available. All research found in the open literature at that time considered seawater already as "high" salinity. A subsequent investigation by the parent company's central research organization, however, corroborated the likelihood that this gradient was the result of a quasi-static, i.e., heat flux only, aquifer, and confirmed this Floris effect as a special case of the Soret effect. Hence, like so often in field studies and real life, (i) all the work done on this point served "only" to confirm there was no problem, but (ii) all that work was indeed necessary to limit the economic risks.

THE VALUE OF MUDLOGS

As mentioned above, one of the main geological aspects of this FDP was a new zonation established across the field, with the reservoir being subdivided into an Upper Lower Sand (ULS) and Lower Lower Sand (LLS). The boundary between these, often being a calcite cemented layer, which (i) was not present everywhere in the field and (ii) even where it was, was established as not necessarily sealing.

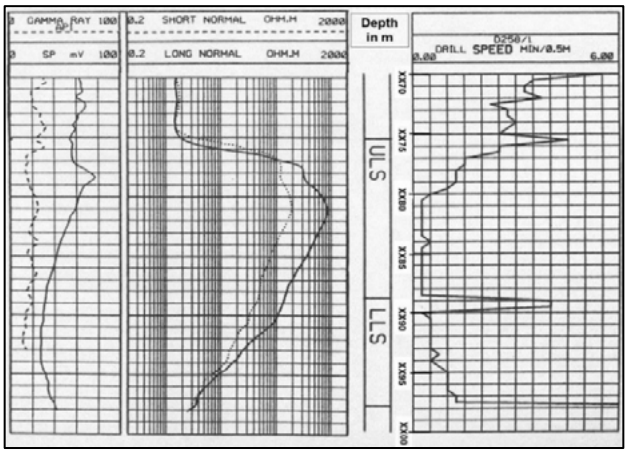


Fig. 4—ROP/drill slowness log as a useful correlation tool.

[3] Named after the person who provided the trigger for this concept.

From Fig. 4, one of the many wells with only a limited set of old vintage wireline logs, it is clear that this subdivision can be very easily picked from the rate of penetration (ROP) or drill slowness log[4], while doing so from the other logs is at least a little more challenging. Clearly, in the years these wells were drilled, the ROP was very diligently recorded, with the obvious benefits forever after. Note also that not only does the calcite cemented layer stand out clearly, but the overall resistivity profile is mirrored in the ROP.

It is to be noted that even today, the question still remains to be answered whether the drill slowness log correlates as well with the main porosity logs (density and sonic) as would normally be expected or whether, in this field, there is an additional correlation with the resistivity log.

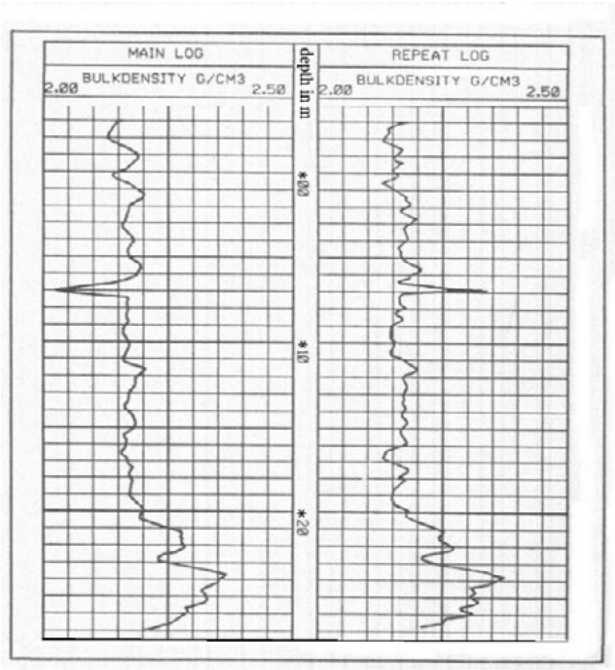


Fig. 5—Main and repeat density across calcite streak.

In Fig. 5, the main and repeat density logs of a modern well are given. In this well, the density tool does not repeat around *07 m AH, the expected position of the calcite streak. That lack of repeatability can easily be attributed to pad movement and caliper irregularities. The main density log reads low instead of showing a higher value, and the repeat log happens to read in line with what would be expected in a calcite cemented layer. The ROP (not shown here) is, of course, less prone than the density log to such artifacts and thus, in cases like this, provides a more robust response than the density log.

Note also that having two truly independent measurements of any one feature is not a matter of full redundancy but may have a clear value of information (VOI), reducing the uncertainty of just a single observation due to some abnormal but unrecognized circumstances.

It should be noted, however, that in the initial massive digitization effort made for this FDP, these ROP logs were not included. Apparently, in the mind of the initial data gatherers and petrophysicists, an ROP log was not considered a normal log to be digitized, not even in a field like this, with very limited wireline logging (WLL) coverage but with plenty of those meticulously recorded drilling progress logs.

In addition to the ROP logs, other conventional elements of the mudlogs of many wells appeared invaluable. Even while only qualitative, the lithological descriptions and comments on the net reservoir and fluid type contents were helpful for the later reviews on fluid contacts, N/G, and establishing an overall consistent field model.

THE CASE OF SINGLE CONTACTS

For quite a few years before the start of this FDP project, the company's formal reserves accounting system, also used for external purposes, stated there was (only) a single field-wide fluid contact across the whole field, implying that on both sides of that main, completely offsetting fault, the contact was at exactly the same level. The underlying reports, maps, and all normal working documents and practices gave one single contact for the whole of the water drive area and another single contact for all of the depletion area. These two single contacts were the result of an earlier petrophysical review. Being so formally documented, these two contacts were not explicitly challenged in the initial stages of the FDP and were thus especially also used to tune the relevant parameters for the history match. Key wells used for the history match included, of course, some wells just at the field contacts.

In that earlier special review of the contacts, the case for the single contacts across the two distinct parts of the field seemed strong. The arguments favoring single contacts included, first of all, excellent

[4] The proper term for a unit of minutes per (half) meter is of course slowness, obviously used in all petrophysical packages, routines, and hence also log plots normally made. However, because of a middle management fear of possibly offending some people in a drilling department, for official plots, such as this one, that term of drill *slowness* had to be replaced by drill *speed*.

reservoir properties: N/G virtually one, 30% porosity, several Darcies permeability, the one tighter layer between the two separate zones not sealing and not even continuous, and excellent capillary pressure behavior. While the very high true formation resistivity (Rt) by itself might suggest the possibility of oil wetting, there was also evidence suggesting/confirming the reservoir was water-wet. Elaborate attempts to turn cores oil-wet with native oil samples, in the operator's research laboratories, had only strengthened the belief of the researchers that the reservoir was just normal water-wet.

It was therefore assumed that the difference between OOWC and OFWL had to be practically zero[5]. Next: other than the major fault, others were considered insufficient to act as barriers, so it was felt there could be no discontinuities in the contacts. Furthermore, without any flow in the aquifer, there was no possibility of a tilted contact due to dynamic forces. Finally, there were no significant variations in salinity of the formation water around the field at the position of the contact. Hence it was concluded that there could only be two single contacts, one on either side of the main fault, and each of these had to be horizontal.

Assuming some logging depth errors in itself is not unrealistic. In another part of the world (Loermans and Ibekwe, 1996), after elaborate relogging and resurveying to check on logging depth errors, there was even a field with the depths of almost one in four wells being wrong. So having to shift "maybe just a few dozen" wells in this 600-well field didn't seem unreasonable, and the single contacts were fixed, put into the company's systems, and taken for granted since.

In the (initial) petrophysical study for this FDP, the variations were observed again, and also, just as in the first few decades of the field's life, some trends in the observed contacts were seen and duly reported. However, while apparently depth errors were no longer assumed, no explanation was attempted for the variations seen, and the issue was not even labeled as possibly problematic or requiring serious follow up. Apparently, one did not ponder about any other risk than, at worst, a tiny little uncertainty in STOIIP. Hence, the whole study team and planning for the new FDP continued with the two single contacts used as before as if there was no problem.

TROUBLE WITH THE SINGLE CONTACTS

(or: *"Houston, we have a problem"*[6])

However convincing the case for two single contacts apparently had been, on closer inspection, too many arguments against it were found. As reconfirmed in the initial petrophysical part of the FDP study, many of the variations were on a trend rather than random as would be expected with wireline-logging job depth errors. Also, however common logging depth errors around the world are, this field being so shallow, and most wells vertical, with little or no hole sticking, made so many errors, and then many of those with magnitudes up to 25 m less likely. As we will see later in this paper, 75% of the wells with relevant contact information would have to be depth shifted. That is an extremely high fraction, almost three times as high as some of the worst cases documented elsewhere with deep, deviated wells with notorious hole sticking problems (Loermans and Ibekwe, 1996). In fact, with such a shallow reservoir and almost only vertical wells, one should expect the (final) logging depths produced by the logging companies throughout the life of the field being very close to the true along hole (TAH) depths, even given the variation in logging procedures used by the different logging companies employed over the years.

Furthermore, when assuming errors on the contacts, one would also expect near identical errors in the depths of other horizons, e.g., formation tops, close to the contacts, but that was not the case. While the contact depths had to be shifted to line up as desired, the tops of the formation were perfectly in line without a shift being necessary! Making matters even more suspicious, while many wells crossing the contacts were shifted by up to 25 m, apparently, there was no need to shift any of the wells not crossing a contact.

Deeming logging depth errors, and thus condemning a series of logging engineers for not having exercised sufficient quality control is one thing, and maybe not unrealistic when not done excessively. But it should be noted that previous generations of petrophysicists during several decades were very well aware of the questions on the position of the contacts when new drilling activity was taking place, also at times when this field was the single most important asset of the national oil company. Hence most likely,

[5] It was interesting to note that while it was clear that this assumption had been made throughout the years, it wasn't explicitly spelled out in the various reports. Apparently, it was considered "so obvious" that it wasn't necessary or even thought of to mention it explicitly.

[6] The origin of this expression is in the Apollo 13 lunar expedition.

the crème de la crème of the petroleum engineering staff was working on it. So, depth shifting also implies that the deemed sloppiness of the logging contractors went hand in hand with inattentiveness from the petrophysicists and other PE and drilling staff involved. However, the opposite was the case. In the first few decades of the field, clearly, the contacts had received lots of attention, but time and again, the conclusion was: Something funny is going on, we've tried hard to figure it out, but we just do not understand it yet.

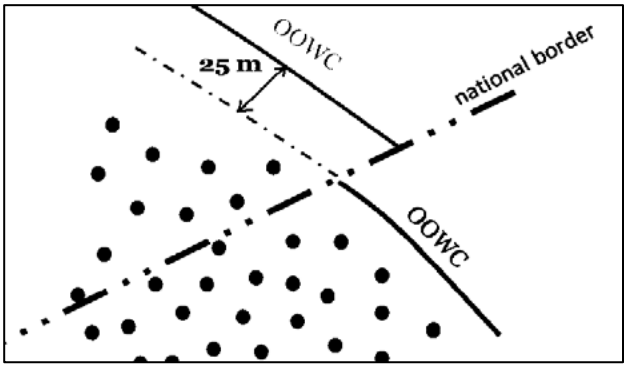


Fig. 6—Contact problem at the national border. The (solid line) OOWC from the special petrophysical review (upper part of the figure) is 25 m deeper than the OOWC carried by the operator in the neighboring country in the lower part of the figure.

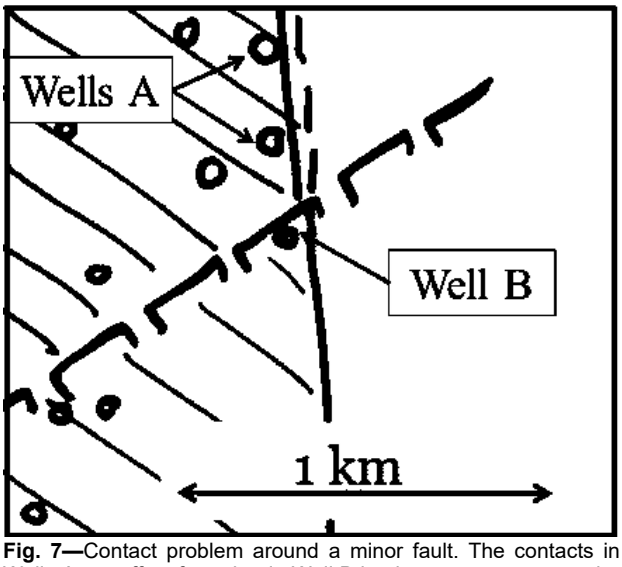


Fig. 7—Contact problem around a minor fault. The contacts in Wells A are offset from that in Well B by the same amount as the throw of the fault.

Another very strong argument casting strong suspicion on the single contacts quickly surfaced. In Fig. 6., the situation at the national border is given. The field, of course, doesn't stop at the national border and doesn't have a major fault right there, so the contact shouldn't jump 25 m. Assuming the wells on our side of the border are on depth leads to the same contact as on the other side of the border.

Yet another strong argument against shifting is illustrated in Fig. 7. In this part of the field, there is a fault, which around the contact has a throw of only a few meters, much less than the reservoir thickness, and the reservoir is very clean, so no clay smearing. Hence there should be contact continuity. Fortunately, there are several wells right at the contact. Surprisingly, the depth shifts which had to be applied to Wells A (actually six wells in a row, not just the two shown in this figure) to force the single contact to line up with that of Well B just so happened to be as large as the throw of that fault at the contact.

Given all of the above, it was clear that the two single contacts could not be justified. Much stronger even, depth shifting without proof in the form of relogging and resurveying at least some wells[7] is not just hard to defend but is like the classical capital sin of adjusting observations to match some firm belief, in this case, the contacts having to be on a horizontal plane.

The problems, of course, then returned: (i) where exactly should the contact(s) be and, possibly more difficult, (ii) provide a sound technical explanation for such other contact(s). As mentioned above, the sole reason for the forced single contacts was "We cannot explain things otherwise."

MORE CONTINUED TROUBLE: MICRO AND DEEP RESISTIVITIES STILL NOT EXPLAINED

Earlier in this paper, the problem with the micrologs was mentioned. While excellent for correlation purposes, and in terms of tool performance, nothing wrong was ever found, these tools just didn't work in this field in the way they worked everywhere else in the world—as an extremely robust net/non-net discriminator.

[7] Relogging at least a few wells would have been relatively cheap: shallow land wells in an active field, and many wells suspected of being in error. Hence, while some wells might have been abandoned, it shouldn't have been hard to find some that were accessible.

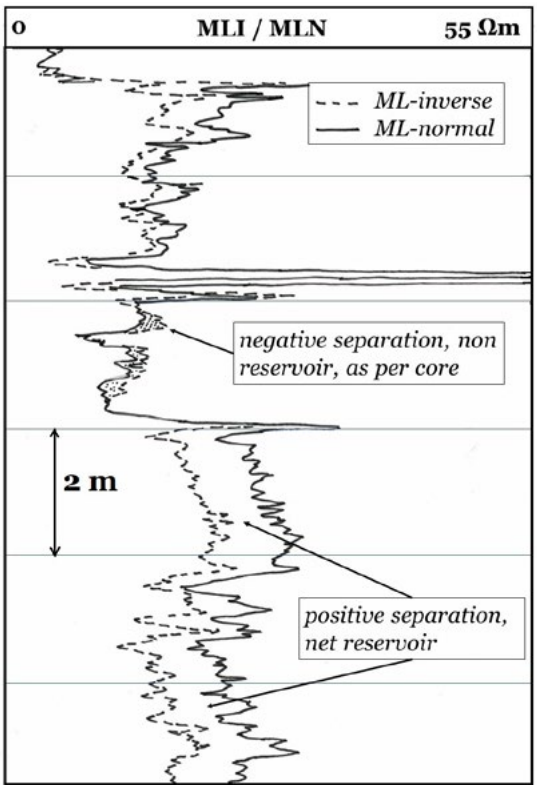


Fig. 8—Normal microlog response, suggesting almost 100% net sand MLN – microlog normal curve; MLI – inverse; MLN reading deeper than MLI.

In Fig. 8, a normal microlog response in this field is given; the net/non-net indications from the microlog are correct and in line with other information. The bulk of the interval is net reservoir, and only a small streak, just below *62 m, is non-net. In Fig. 9, however, the situation is different. Here the microlog suggests almost all the intervals to be non-net. Yet, all other data, including core and production data, prove the opposite; this well is just like all the others, with a very high N/G. Tool malfunctioning or peculiar logging conditions were, of course, thoroughly investigated and ruled out.

Thus, in an attempt to explain this microlog behavior, as part of the initial petrophysical work for this FDP, a major effort of microlog tool modeling was performed. But alas, this only reconfirmed the problems as still unexplainable.

While in this new FDP, the micrologs were only used for correlation, the deep resistivity curves were, of course, the basis for the quantitative saturation and STOIIP/reserves calculations. That deep resistivity log interpretation also had its fundamental questions. As indicated in Fig. 3, the Archie parameters m = n = 1.7 and a = 1 were used based on plenty of available core data and in line with normal values for water-wet sandstones. However, the deep, true formation resistivities were “too high” in the upper part of the

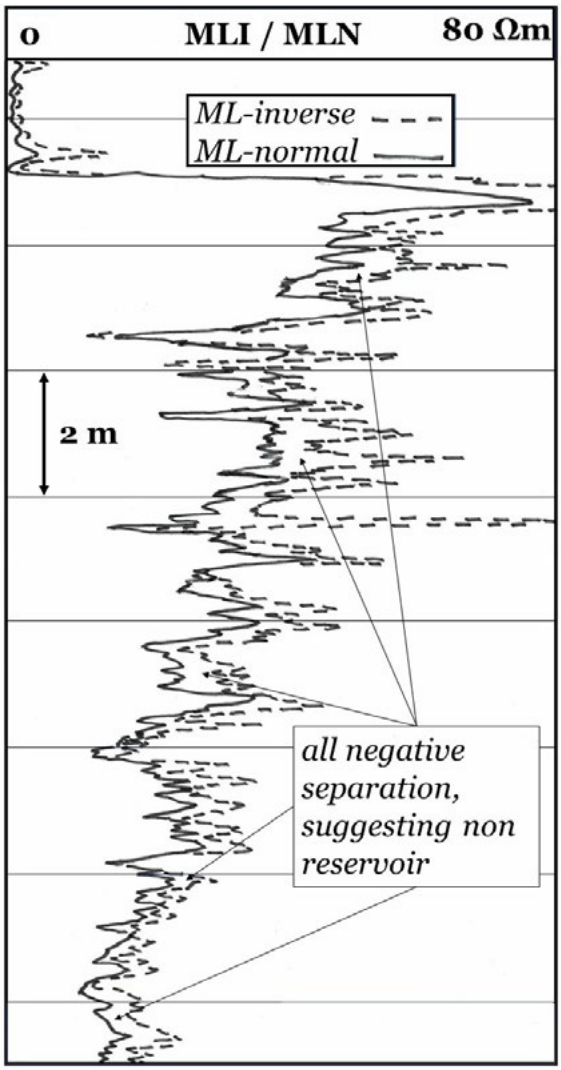


Fig. 9—Microlog showing almost 100% negative separation, suggesting non-net reservoir, contrary to all other information.

formation, leading to oil saturations higher than expected from cap curves. Some oil wetting of the pores, in an Archie interpretation represented with an n varying between 3 and 5, would partly tackle the problem, but as mentioned before, there were many indications that any such oil wetting didn’t occur.

The above situation was very worrying. The response of the most elementary tools of our profession, resistivity logs, be it micro or deep, could not be explained. Hence, while crunching saturations, STOIIP, and reserves from these logs produced numbers, which presumably were at least roughly correct, it’d be hard to argue the field was understood.

HYPOTHESES FOR A SOLUTION: POST-CHARGE TILTING AND WAX-SATURATED OIL

Some observations, also in the aquifer intervals where residual oil was found, directed attention to the contacts to the structural history of the system. The presence of wax in the oil then yielded some ideas for an explanation for the other questions.

The whole system is relatively young. At a geological timescale, there was barely time for the field to be charged, and after charge, further movement took place, effectively resulting in oil slushing from one end of the structure to the other, including from one (future) country to the other, across the (future) border. Also, given that such movements had taken place so recently, residual oil from these movements, labeled paleo-oil, might not be distinguishable from (i) current-day residual oil after production and (ii) low but still mobile/virgin saturation. Especially also, post-charge tilting of the structure might lead to such paleo-oil sitting right below the OFWL. Hence the hypothesis, what was observed as a trend in what was thought to be the OOWC in parts of the field, not on a horizontal plane, might be the "Paleo-OWC," which, in paleo-times was in line with the PFWL, but after tilting a new FWL, now OFWL being established, with the OOWC at the tilt angle below it.

While oil wetting of the rock is unlikely, the high wax content of the crude triggered the next hypothesis. Assuming the wax at virgin reservoir conditions is at (near) saturated levels, it might precipitate by only minor temperature changes, e.g., the cooling caused by circulating mud when drilling. Such precipitation of wax could create a barrier for invasion, explaining the microlog response and possibly also the very high resistivities, all without a need for conventional oil wetting. Small temperature variations, either from differences in the exact drilling conditions and time between drilling and logging or caused by water injection, would, of course, affect the conditions at the reservoir scale and thus might explain the variations in the appearance[8] of resistivity logs and problems with wax production.

Support for this concept of wax precipitation came from the behavior of a reservoir block which, in the post-charge faulting, had dropped a few hundred meters. Thus, due to the higher temperature, this block would be much less susceptible to wax precipitation, and indeed micrologs, high resistivities, and production wax issues were much less of an issue in that block.

ESTABLISHING THE CORRECT OFCs

With the above concept of the possibility of residual/paleo-oil below the OFWL and the inability to distinguish such from (i) low-saturation mobile oil above the OFWL and (ii) residual oil due to the previous production, in order to establish the OFWL, two levels, which should be recognizable from the well logs available, were introduced: free water up to (FWUT) and mobile oil down to (MODT). The OFWL then is to be between the FWUT and the MODT. With that, thanks to the large well density and indeed the constraint of the FWLs having to be on a horizontal plane in every separate reservoir block, establishing the correct OFCs was relatively straightforward.

The new OFCs (Figs. 10 and 11) were very different from the two single contacts. In some places, an OFC was 25 m deeper and, in others, 24 m higher. The problem at the national border also disappeared. There was a large fault not too far away from the border. The large throw, combined with the higher clay content and low N/G in that area, is likely to provide sealing capacity. As a lucky element for the country, the sealing capacity of that fault had thus prevented, in paleo times, slushing 25-m oil column from the main part of the field to that country on the other side of the border.

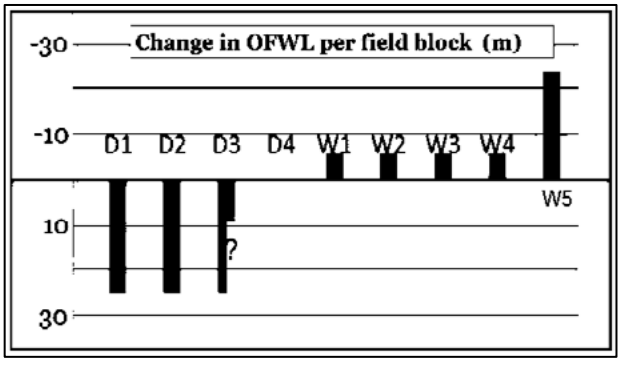


Fig. 10—Changes in OFWL.

[8] Through the years, of course, major efforts had been spent to map the problems with high resistivities, the micrologs and wax. Other than general trends with the odd few, or rather too many, exceptions, no explanation was found. With this new hypothesis that becomes logical. In all those trend reviews, including the elaborate microlog study during this FDP, no attempts had been made to consider possible temperature variations from differences in drilling and logging conditions.

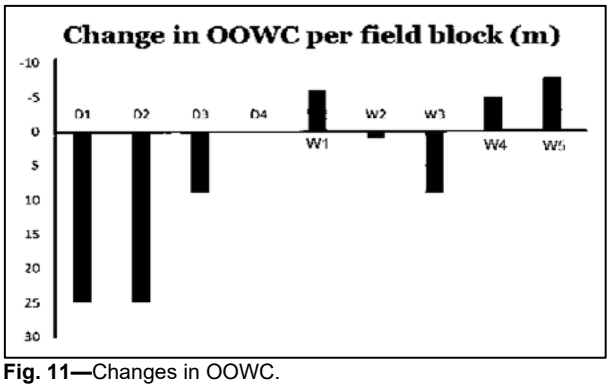


Fig. 11—Changes in OOWC.

With these new contacts, now, of course, some of the post-charge structural movements may be pinpointed and quantified exactly.

In this new model, there is no indication of any single well relevant for establishing the contacts having a logging depth problem. This is in contrast with that earlier perception, where 31 wells had to be shifted by 2 m to 25 m to match the model of the horizontal OOWCs. Given that there are only 41 wells with relevant discriminatory information, it means that the presumption was that 75% of the wells had serious depth problems.

The impact on STOIIP was minimal. Discounting the residual/paleo-oil between the new FWL would lead to less than a 10% reduction in STOIIP, obviously not insignificant but not dramatic. For a steamflood, even such paleo/residual oil would be recoverable, so to be included for STOIIP calculations.

It is worthwhile to note that, rather than the three man-weeks originally planned for all of the remaining work as mentioned previously, it took a full year to reach this point.

OFCs ARE FOR A HISTORY MATCH WHAT O-RINGS ARE FOR A SPACE SHUTTLE

Because of the changes in the OFWLs, the foundation of the history match disappeared. Some wells used in that match changed from having their feet just above the OFWL to having a quarter of their net thickness below the OFWL. In other places, the OFWL changed by as much as 24 m up or 25 m down. Such changes are, of course, dramatic, and hence one of the main pillars for the FDP disappeared. This lack of a solidly founded plan was one of the main reasons the FDP was not executed, and for lack of a viable alternative plan, the field was shut in and abandoned.

A comparison between the OFCs and O-rings of the solid rocket boosters of a space shuttle thus comes up. OFCs, as well as O-rings, are very thin rings around a large structure, with intricacies studied and understood by only a few specialists of a technical subdiscipline which, in the unofficial pecking order of the trade, is certainly not the highest in rank. But, however thin, if there's a serious problem with those rings, disaster may strike, as it did with both the Challenger space shuttle and this FDP. The history match, shattered because of the wrong OFCs, dragged the FDP in its fall. Hence we may claim that OFCs are for an FDP what O-rings are for the solid rocket boosters of a space shuttle.

DISCUSSION

The fluid contact review several years prior to the FDP may be labeled as the root cause of the field abandonment. Hence this case is a Type 2 depth error leading to a Category 4 mishap. Painful though it might sound, following metrological guidelines and terminology for uncertainty handling, that fluid contact review has to be classified as the type of error that, as per section 3.4.7 of ISO, 1993 (Blunders), can have ultimate consequences way beyond what normal methods of uncertainty quantification can tackle. Yet, just like any major accident has not just a single root cause but requires a series of further mishaps, that contact review was just one of several issues which went wrong. Furthermore, even though it was indeed the root cause and a blunder, it should not be considered as the worst problem in the whole sequence.

In the FDP study team, there was clearly a lack of recognizing potential technical risks associated with the project. The response of the most fundamental logs of the trade, resistivity logs, deep *and* micro, and the observed variations in fluid contacts were not understood. Furthermore, the obtained tuning parameters from the history match were well out of line with normal values. That ought to lead to significant uncertainties, if not alarm bells, accompanying the expectation values and recommendations for business decisions. However, there was an almost religiously sticking to the belief in the obtained history match and the resulting development plan and forecast.

Last but alas not least, the autonomy that the FDP study team enjoyed under an asset-based organization appeared to have some significant drawbacks. That autonomy allowed and achieved focused and efficient work and meant there was very little *obligation* to have professional work vetted by central discipline authorities. Unfortunately, with the particular team

management present, that same autonomy allowed some improper constraints on technical professional work when that might be yielding results that could raise questions about the desired business development. As a consequence, some technical work was impeded, and there were at least some delays in reaching the ultimate conclusions and understanding of the field.

Of course, the 75% of STOIIP still in the ground meant there was ample potential left, but it took many years and a different approach before, finally, like a phoenix rising from its ashes, a new life for the field emerged.

LESSONS LEARNED

The main learning points from this field study are:

- Small inconsistencies, easily put aside by development teams under pressure for delivery as: "Outstanding challenge, but not critical for the current plans" might lead to far larger uncertainties than typically accounted for.
- Even the world's best history match achieved with the most sophisticated reservoir simulator is not better than the quality of the input data.
- OFCs are for an FDP what O-rings of solid rocket boosters are for a space shuttle—tiny little rings with intricacies barely understood by many, seldom heard of by most, but if anything is seriously wrong with those, it leads to disaster.
- While data and even information about reservoirs might be in databases and historical records, field knowledge is (still) only in the heads of the people who have studied those reservoirs, and FDPs are made based on that knowledge.
- In too many commercial organizations, archiving and librarian functions are undervalued.
- Advantages of autonomy in an asset-based organization will be partly offset when such autonomy leads to undue pressure on the ways in which technical quality work may be achieved.

ACKNOWLEDGMENTS

The work described, of course, could not have been done without the help, ideas, and support from several other people, of whom only a few are mentioned here. I thank Harm Frikken†, geologist and closest team colleague, for many fruitful discussions, suggestions to consider the structural geology history, and his continuous support on all fronts. I recognize Johan van Luijk, reservoir engineer, for his contributions to reservoir simulation and support on resulting issues. Thanks also go to Tom Pieterse, former head of reservoir engineering, for reviewing this paper. I also recognize Floris for his ingenuity and observation skills, triggering the concept of the Floris effect, and Annemijn for bringing new life on what thus has become the best day of the year and her stimuli to maintain scientifically justified and otherwise sensible approaches.

NOMENCLATURE

AH = along hole (for loggers or drillers depth)
FDP = field development plan
FWL = free-water level – the hydrocarbon-water contact in an infinitely large pore; often established with formation pressure testers; in a static situation to be on a horizontal plane
FWUT = free water up to – level in this study guesstimated from resistivity logs/calculated saturation profile for free-water presence, as a lower limit for FWL
MODT = mobile oil down to – level guesstimated from resistivity logs / calculated saturation profile for mobile oil presence, as an upper limit for FWL
N/G = net-to-gross ratio
OFC = original fluid contact, either OFWL or OOWC; original referring to the time of discovery of the field
OFWL = original free-water level
O = (prefix) original – as at the time of discovery of the field
OOWC = original oil-water contact (excluding residual paleo-oil)
OWC = oil-water contact – the physical contact line between a 100% water-bearing layer and one with some oil; in a water-wet rock, the OWC is above the FWL due to capillary forces; it does not have to be on a horizontal plane
P = (prefix) paleo – as at some early geological time, after charge but (long) before discovery
PC = personal computer
PE = petroleum engineering
PFWL = paleo-free water level
POWC = paleo oil-water contact
Pp = petrophysics
Rt = true formation resistivity

STOIIP = stock tank oil initially in place
TAH = true along hole (for depth)
VOI = value of information
WLL = wireline logging

REFERENCES

Bolt, Loermans, and Kimminau, 1999, On the Quest for Depth, Paper B, *Transactions*, *SPWLA 40th Annual Logging Symposium*, Oslo, Norway, 30 May–3 June.

International Organization for Standardization (ISO), 1993, *Guide for the Expression of Uncertainty in Measurements*, first edition, ISO, Geneva, Switzerland. ISBN: 92-67-10188-9.

Loermans, A.M., and Ibekwe, C.O., 1996, Plea for a Further Quest for the Most Important Logging Parameter, Paper E035, *Conference Proceedings*, *58th EAGE Conference and Exhibition*, Amsterdam, Netherlands, 3–7 June. DOI: 10.3997/2214-4609.201409057.

Loermans, A.M., 1999, Major Challenges in Old Oil Field Solved, Paper U, *Transactions*, *SPWLA 40th Annual Logging Symposium*, Oslo, Norway, 30 May–3 June.

Loermans, A.M., 2014, Illustrations of Medium Severity Mishaps Caused by Inadequate Log Quality Control. Or: How Common Tiny Little Errors Can Have Sizable Consequences, Poster presented at the DEVEX Conference, Aberdeen, Scotland, 6–7 May.

SPWLA SECOND BOARD OF DIRECTORS MEETING
REMOTE
JULY 15, 2022

President Tegwyn Perkins called the meeting to order at 8:05 am.

In attendance, President-Elect, Jennifer Market, Vice President Technology, Iulian Hulea, Vice President Education, Kelly Skuce, Vice President Finance, Secretary and Admin, Adam Haecker, Vice President Publications, Stephanie Perry, Vice President Information Technology, Harry Xie, Vice President, Mathilde Luycx, Regional Director N. America 1, Javier Miranda, Regional Director Europe, Eva Gerick, Regional Director Middle East/Africa, Jennifer Duarte, Regional Director Asia Pacific/Australia, Ryan Lafferty, Regional Director Latin America, Nelson Suarez Arcano, and Executive Director, Sharon Johnson. Not in attendance, Regional Director N. America 2, Matthew Blyth.

A motion made by President-Elect Jennifer Market to waive the reading of the minutes from the June BOD meeting was seconded by Vice President Education, Kelly Skuce. This motion passed by majority vote.

Board discussion included adding committees for Education and Social Media.

SPWLA parent organization will host a first-time stand-alone golf tournament in October.

Meeting adjourned at 1:15 pm.

Respectively Submitted by
Sharon Johnson
Executive Director

Next BOD meeting: September 9 in person at the SPWLA Business Office Houston or remote via GoToMeeting.

BOD Special Sessions

August 5, 2022

List of Distinguished Speakers via Survey Monkey to accept the following

A motion made by Vice President Education, Kelly Skuce to accept his proposed list of Distinguished Speakers for 2022-2023 was seconded by President-Elect Jennifer Market.
Passed by majority vote.

August 25, 2022

Lecture/Training Center Lease via Survey Monkey to accept the following.

A motion made by Vice President Finance, Secretary and Admin, Adam Haecker to permanently close and liquidate all furnishings and AV equipment in the Frank S Millard lecture/ training center attached to the SPWLA business office in Houston TX at the end of the current lease was seconded by Regional Director Latin America, Nelson Suarez Arcano.

Action Item: Executive Director, Sharon Johnson to sell, dispose or retain all furnishings and AV equipment at her sole discretion.

Both passed by majority vote.

Proposed Amendments to SPWLA Bylaws and Articles of Inc

Per Article VI, Section I of the current Bylaws the Board of Directors of the Society of Petrophysicists and Well Log Analysts is to periodically review the Corporation's Bylaws and Article of Incorporation and make recommended changes or updates to the govern documents. The Board proposes that the membership vote for a new board position of VP Technology Elect, along with some general housekeeping changes, which are highlighted in red and underlined for easy recognition.

Summary of the changes:

- AOI & Bylaws:
  - UPDATE: General housekeeping (i.e., standardization of "Corporation" vs. "corporation").
  - UPDATE: Grammar changes to reflect DE&I (diversity, equity, and inclusion). Primarily identity pronouns.

- AOI
  - NEW: "To be eligible to vote in elections, members must have paid their annual dues by February 1st of that year."
  - UPDATE: Nominee requirements have been further defined.

- Bylaws
  - NEW: Addition of a new Board of Directors position: VP Technology Elect.
  - NEW: President Elect assumes responsibility for Special Interest Groups.
  - UPDATE: Expansion of duties for VP Information Technology and VP Social Media Committees.
  - UPDATE: The Symposium host chapter is ineligible to receive the Outstanding Chapter Award the year they host.
  - UPDATE: Addition of Outstanding Student Chapter Award.
  - UPDATE: Distinction between those awards recommend by the Awards Committee and those by the Board of Directors.

The Board of Directors strongly urge you to vote for these changes using the ballot link that will be sent to you via Survey Monkey by separate announcement on (30 DAYS FROM THIS NOTICE)

Bylaws of the Corporation

Amendments

Revised December 31, 1995
Article VII Business Office, Section 2, Revised May 23, 1996
Article V Local Chapters, Section 9, Revised December 31, 1998
Article I Officers and Duties, Section(s) 1, 2, 10 and 11, Revised December 31, 2001
Article II Board of Directors, Section 1, Revised December 31, 2001 Revised, Name change, May 23, 2003
Article I Officers and Duties, Section 2, Revised, May 14, 2004
Article I Officers and Duties, Section 2, Revised, May 11, 2007
Article VI Amendments, Section 2, Revised, March 2, 2018
Article II Board of Directors, Section 5, Revised June 1, 2018
Article IV Dues and Fees, Section 1, Revised June 1, 2018
Article V Local Chapters, Section(s) 1, 3, 5, and 6, Revised June 1, 2018
Article VI Amendments, Section 1, Revised June 1, 2018
Article VIII Standing Committees, Section 3, Revised June 1, 2018
Article I Officers and Duties, Section 1, 2, and 4, Revised September 19, 2019
Article II Board of Directors, Section 5, Revised September 19, 2019
Article V Local Chapters, Section 3 and 5, Revised September 19, 2019
Article VI Amendments, Section 1, Revised September 19, 2019
Article VIII Standing Committees, Section 1, 2, and 4, Revised September 19, 2019
Article VIII Standing Committees, Section 7, New September 19, 2019
Article X Awards, Section 2, 3, 4 and 5, Revised September 19, 2019
Article XI Conflict of Interest, New September 19, 2019
Article I Officers and Duties, Section 1, Revised December 21, 2020
Article I Officers and Duties, Section 11, New December 21, 2020
Article I Officers and Duties, Section 12, Revised December 21, 2020
Article II Board of Directors, Section 1, Revised December 21, 2020
Article VIII Standing Committees, Section 7, Revised December 21, 2020

ARTICLE I Officers and Duties

Section 1.
The officers of Society of Petrophysicists and Well Log Analysts, Inc. (the "Corporation" or "SPWLA") shall be: President, President Elect, Vice President Technology, Vice President Technology Elect, Vice President Finance, Secretary and Administration, Vice President Education, Vice President Publications, Vice President Information Technology and Vice President Social Media.

Section 2.
The terms of office shall be as provided for in Article 6 of the Amended and Restated Articles of Incorporation.

Section 3.
If the office of the President is vacated for any reason, the President Elect shall assume the office of President in addition to holding the office of President Elect. If the office of President Elect is vacated for any reason, the Board of Directors shall then appoint a President Elect from the elected members of the Board of Directors to serve the balance of the term. If any other office is vacated, the Board of Directors shall appoint a qualified Member to that office for the balance of the term.

Section 4.
The President shall preside at all meetings of the Corporation and of the Board of Directors and shall be an ex officio member of all Corporation committees. The President shall appoint all Standing Committees and shall perform duties that pertain

to the direction of the Corporation. The President has the authority to approve single expenses for a total of up to 2% of the total budget per year. Beyond this amount, the President must obtain the approval of the Board of Directors.

Section 5.
The President Elect shall succeed to the office of President at the conclusion of their term as President Elect. The President Elect shall be responsible for liaison activities with other technical societies, preparation of an annual report of the Corporation, shall maintain liaison with all SPWLA Special Interest Groups and any other duties assigned by the President. The President Elect shall preside in the absence of the President.

Section 6.
The Vice President Technology shall be responsible for the technical programs of the Corporation and shall chair the Technology Committee. The Vice President Technology shall preside in the absence of the President and the President Elect.

Section 7.
The Vice President-Technology Elect shall succeed to the office of Vice President-Technology at the conclusion of their term as Vice President-Technology Elect. The Vice President-Technology Elect shall assist the Vice President-Technology in developing the technical programs of the Corporation and co-chair the Technology Committee. The delegation of duties will be decided by the Vice President-Technology. The Vice President-Technology Elect shall preside in the absence of the Vice President-Technology at Technology Committee meetings.

Section ~~7~~ 8.
The Vice President Education shall be responsible for all educational programs of the Corporation, shall maintain technical liaison with all Chapters-at-Large, and shall chair the Education Committee.

Section ~~8~~ 9.
The Vice President Finance, Secretary and Administration shall chair the Finance Committee and be responsible for recommending the approval of applicants for membership in the Corporation.

Section ~~9~~ 10.
The Vice President Publications shall coordinate the publication functions of the Corporation and shall be chairman of the Publications Committee.

Section ~~10~~ 11.
The Vice President Information Technology shall coordinate all electronic information technology of the Corporation.

Section ~~11~~ 12.
The Vice President Social Media shall coordinate all interactions with Social Media for the Corporation. The Vice President Social Media shall be knowledgeable and active on social media channels. Promote SPWLA Parent events, push feed news on SPWLA multiple social media channels from, but not limited to, email from the SPWLA Business Office. Accept new followers on the various social media platforms. Keep track of communications from followers on the various social media platforms. Distribute news from all chapters by re-posting and commenting on chapters' social media channels.

Section ~~12~~ 13.
The fiscal year of the Corporation shall be from May 1st through April 30th.

ARTICLE II Board of Directors

Section 1.
The Board of Directors shall be comprised of the ~~eight~~ nine officers and six regional directors.

Section 2.
The duties of the officers are as stated in Article I.

Section 3.
The six regional directors shall: assist in the formation of new chapters, work as a liaison between chapters and the Board of Directors, assist the chapters in their operation, and handle other duties assigned by the President.

Section 4.
The Board of Directors is empowered to design, adopt, issue, and regulate the use of Corporation emblems, seals, certificates, and awards.

Section 5.
Any member of the Board of Directors may be removed from office if they fail to meet minimum levels of participation in Board meetings or fail to execute their required duties expressed in these bylaws. Removal shall be confirmed by the affirmative vote of two-thirds of the full Board of Directors. The Board shall appoint a replacement from the membership by the affirmative vote of two-thirds of all persons who then constitute the Board of Directors. The President is eligible to vote.

ARTICLE III Meetings

Section 1.
The Corporation as a whole shall hold an Annual Meeting each year at a time and place designated by the Board of Directors. The Corporation shall conduct its business and consider such matters as may be of concern to the membership at this meeting. A technical symposium may be held in conjunction

with the Annual Meeting at the discretion of the Board of Directors.

Section 2.
The President may call Board of Directors meetings as needed to conduct the business of the Corporation.

Section 3.
All meetings shall be conducted under Robert's Rules of Order.

ARTICLE IV Dues and Fees

Section 1.
There are no initiation fees to join the Corporation. If an initiation fee is established, such fee shall be determined by the Board of Directors.

Section 2.
All members of the Corporation, Honorary Members excepted, shall pay annual dues. The amount of the dues shall be established by the Board of Directors. Dues shall be paid by January 1st or upon election to membership. Statements shall be delivered by November 1st preceding the due date, and membership cards shall be issued. If payment is not received by January 1st, membership privileges cease for a four-month grace period, after which the member is removed from the roster, unless dues have been paid. Supplemental notices will be delivered to members delinquent in payment.

ARTICLE V Local Chapters

Section 1.
Amendments to the bylaws may be proposed by a committee appointed by the President or by the Board of Directors, or by petition in writing by ten members of the Corporation. Proposed amendments shall be published prior to being submitted to vote by the membership. All such amendments must be submitted to the voting membership by letter mail, electronic mail or other suitable means within one year of the date of receipt. The affirmative vote of two-thirds of the membership (abstentions and no response not included in the count) will be required for adoption of an amendment.

Section 2.
Chapters of the Corporation shall be responsible to, and subject to, the rules and regulations of the Corporation.

Section 3.
Chapters of the Corporation may be organized as local chapters, established to further the purposes of the Corporation as stated in Article IV of the Amended and Restated Articles of Incorporation, representing a limited geographical area. The geographical areas of the local chapters shall be approved and/or designated by the Board of Directors of the Corporation.

Section 4.
Chapters of the Corporation may be organized as Chapters-at-Large, established to further specific technical areas relating to formation evaluation.

Section 5.
No member of the Corporation shall be denied membership in a chapter. Members in the Corporation can only hold membership in one chapter at a time. Chapter membership classes, rights, and obligations shall be established in the Chapter bylaws.

Section 6.
Members of the chapters who are not members of the Corporation shall be known as Affiliate Members of the chapters. They are not qualified to vote in the chapter or hold any chapter offices. They are not entitled to any privileges of the Corporation.

Section 7.
Chapter bylaws shall include a statement concerning disposition of chapter funds in the event of dissolution of the chapter.

Section 8.
Each Chapter shall maintain a copy of their current bylaws on file in the SPWLA Business Office. Amendments to chapter bylaws shall be approved by the Board of Directors of the Corporation.

Section 9.
Contractual and/or financial agreements made by a Chapter are not binding on the Corporation unless specifically authorized by the Board of Directors of the Corporation.

ARTICLE VI Amendments

Section 1.
Amendments to the bylaws may be proposed by a committee appointed by the President or by the Board of Directors, or by petition in writing by ten Members of the Corporation. Proposed amendments shall be published prior to being submitted to vote by the membership. All such amendments must be submitted to the voting membership by letter mail, electronic mail or other suitable means within one year of the date of receipt. A two-thirds majority vote (abstentions and no response not included in the count) will be required for adoption of an amendment.

Section 2.
All amendments to the bylaws must conform to the applicable provisions of the Oklahoma statutes and laws.

Proposed Amendments to SPWLA Bylaws and Articles of Inc

ARTICLE VII Business Office

Section 1.
The Corporation offices shall be established and maintained in a location or locations selected by the Board of Directors. The Board of Directors has the responsibility of providing for suitable office space and determining the equipment, personnel, and cost of all items and salaries incidental to the efficient and prudent operation of a Business Office.

Section 2.
The Executive Director shall be the business manager for the Corporation and shall be responsible to the Board of Directors through the President. The Executive Director shall be appointed and/or dismissed by action of the Board of Directors.

Section 3.
The duties of the Business office manager shall be specified by contractual agreement approved by the Board of Directors. These duties shall include recording of the minutes of all Board of Directors meetings and the Annual Meeting and obtaining regular financial reports as directed by the Board of Directors.

ARTICLE VIII Standing Committees

Section 1.
Appointments to all Standing Committees shall be made by the President upon recommendation of the specific committee chairpersons. Tenure of all Standing Committee members shall be at the discretion of the committee chairpersons. The President shall make every effort to appoint diverse Committees without discrimination of on the basis of age, race, religion, gender, sexual orientation, geographical origin, or company affiliation.

Section 2.
Technology Committee: The Vice President Technology shall chair the Technology Committee. The Vice President Technology Elect shall chair in the absence of the Vice President Technology. The committee shall be composed of the chair and a minimum of ten members, two of whom must be Regional Directors. The Technology Committee shall have the following responsibilities:

- Arrange the technical program of the Annual Meeting. Supervise publication of the Transactions of the technical program of the Annual Meeting. Recommend and supervise workshops and short courses associated with the Annual Meeting. Promote research, both applied and basic, toward the resolution of petrophysics and well logging problems.
- Foster the acceptance by the industry of the basic nature of well log analysis in formation evaluation.
- Accumulate, catalog and make available to all members basic data such as water resistivities, core measurements, etc.

Section 3.
Publications Committee: The Vice President Publications shall chair the Publications Committee. The committee shall be composed of the chair and a minimum of six members, two of whom shall be Regional Directors. The Publications Committee shall have the following responsibilities:
Supervise the preparation, editing and publication of all Corporation publications, with the exception of the Transactions of the Annual Meeting.

Section 4.
Awards Committee: The Immediate Past President shall be chairman of the Awards Committee. The committee shall be composed of the chairman and a minimum of five members. Those five members shall include the Vice President of Technology, at least one Past President, and at least one former recipient of an award of the Corporation. The Awards Committee shall be responsible for recommending recipients of awards of the Corporation to the Board of Directors.

Section 5.
Finance Committee: The Vice President Finance, Secretary and Administration shall chair the Finance Committee. The committee shall be composed of the chair, the President, the President Elect, and the Executive Director. The Finance Committee shall have the following responsibilities:

- Obtain regular financial reports as directed by the Board of Directors.
- Prepare an annual budget for the Society's operations.
- Obtain an annual audit of the Corporation's receipts, disbursements, and assets.

Section 6.
Education Committee: The Vice President Education shall chair the Education Committee. The committee shall be composed of the chair and at least four other members, two of whom must be Regional Directors. The President of each Chapter-at-Large shall also be a member of the Education Committee. The Education Committee shall have the following responsibilities:

- Recommend topical conference topics to the Board of Directors and supervise the technical program of topical conferences.
- Maintain technical liaison with Chapters-at-Large.
- Administer a Distinguished Speaker program at the direction of the Board of Directors.

Section 7.
Information Technology Committee: The Vice President Information Technology shall chair the Information Technology Committee. The Information Technology Committee shall be composed of the chair and at least two other members, one of whom must be a former Vice President Information Technology. The Information Technology Committee shall have the following responsibilities:

- Manage, maintain and develop the society's web-presence
- Manage, maintain and develop the society's abstract submission process
- Manage and maintain the society's email system

Section 8.
Social Media Committee: The Vice President Social Media shall chair the Social Media Committee. The Social Media Committee shall be composed of the chair and at least four other members, two of whom must be officers of chapters including student chapters. The Social Media Committee shall have the following responsibilities:

- Distribute updates from the SPWLA that usually get distributed via email from the SPWLA office, in multiple social media channels.
- Regularly distribute news from all chapters by re-posting and commenting on chapters' social media channels.
- Accept new followers on the various social media platforms.
- Maintain and distribute videos on SPWLA's YouTube channel.
- Keep track of communications from followers on the various social media platforms.
- Promote SPWLA events and feed news during SPWLA events like the Annual Symposium and Topical Conferences.
- Help co-host webinars when necessary for VP of Education.

ARTICLE IX Temporary Committees

Section 1.
Nominating Committee: The Nominating Committee is a Temporary Committee. The immediate Past President shall be chairman of the Nominating Committee. Tenure of the committee terminates at the Annual Meeting.

Section 2.
Temporary Committees, with the exception of the Nominating Committee, may be appointed by the President to act on Corporation business which does not fall within the responsibilities of the Standing Committees. Tenure of all Temporary Committee members shall be at the discretion of the President or the committee chairmen.

ARTICLE X Awards

Section 1.
Awards: The awards of the Corporation shall include awards for technical achievement and awards for service to the Corporation, as detailed in the following section.

Section 2.
Awards for Technical Achievement: Awards for technical achievement may be granted by the Board of Directors to members or former members of the Corporation as follows:
Gold Medal for Technical Achievement: The Gold Medal for Technical Achievement is the highest honor bestowed on any individual by the Corporation. It is awarded for outstanding achievements in the science of formation evaluation that result in significant and enduring contributions to the technology. The Gold Medal award shall be accompanied by an award of Honorary Membership. Award of the Gold Medal shall be confirmed at a meeting of the Board of Directors by an affirmative vote of at least two-thirds of the Board of Directors. No more than one Gold Medal shall be awarded in a calendar year. A Gold Medal need not be awarded every year.
Distinguished Technical Achievement Award: The Distinguished Technical Achievement Award is presented in recognition of exceptional contributions in one or more specific areas of formation evaluation technology. No more than three Distinguished Technical Achievement Awards shall be awarded in a calendar year. Distinguished Technical Achievement Awards need not be awarded every year.
Meritorious Technical Achievement Awards: Meritorious Technical Achievement Awards are presented for specific technical contributions in a given year and may be awarded to as many individuals as appropriate.

Section 3.
Awards for Service: Awards for service to the Corporation may be granted by the Board of Directors to members or former members of the Corporation as follows:
Medal of Honor for Career Service: The Medal of Honor for Career Service is awarded to an individual in recognition of extraordinary and long-term service to the Corporation. The service shall further the purposes of the Corporation as set forth in Article IV of the Amended Articles of Incorporation. The Medal of Honor Award shall be accompanied by an award of Honorary Membership. Award of the Medal of Honor shall be confirmed at a meeting of the Board of Directors by an affirmative vote of at least two-thirds of the Board of Directors. No more than one Medal of Honor shall be awarded in a calendar year. A Medal of Honor for Career Service need not be awarded every year.
Distinguished Service Award: The Distinguished Service Award is presented in recognition of outstanding service to the Corporation in the form of work on a specific project or project during a period of several years. No more than three Distinguished Service Awards shall be awarded in a given year. A Distinguished Service Award need not be awarded every year.
Meritorious Service Award: The Meritorious Service Award is presented in recognition of praiseworthy service to the Corporation during a given year and may be awarded to as many individuals as appropriate.

Section 4.
Other Awards: Other awards of the Corporation shall include:
SPWLA Award of Appreciation: The SPWLA Award of Appreciation is awarded by the Board of Directors to a non-member of the Corporation who has performed some notable service to the Corporation. This award is made as needed and need not be awarded every year.
Outstanding Chapter Award: The Outstanding Chapter Award is awarded by the Board of Directors in recognition of an outstanding accomplishment by a Chapter of the Corporation. The accomplishment shall further the purposes of the Corporation, as set forth in Article IV of the Amended Articles of Incorporation. It may have occurred over one or more years and have involved the participation of numerous members of the chapter. No more than one Outstanding Chapter Award shall be awarded in a calendar year. The Outstanding Chapter Award need not be awarded every year. The Symposium host chapter is ineligible to receive the Outstanding Chapter Award the year they host. No chapter is eligible to receive the Outstanding Chapter Award in consecutive years.
Outstanding Student Chapter Award: The Outstanding Student Chapter Award is awarded by the Board of Directors in recognition of an outstanding accomplishment by a Student Chapter of the Corporation. The accomplishment shall further the purposes of the Corporation, as set forth in Article IV of the Amended Articles of Incorporation. It may have occurred over one or more years and have involved the participation of numerous members of the chapter. No more than one Outstanding Student Chapter Award shall be awarded in a calendar year. The Outstanding Student Chapter Award need not be awarded every year. No student chapter is eligible to receive the Outstanding Student Chapter Award in consecutive years.
Young Professional Technical Award: The Young Professional Technical Award is bestowed by the Board of Directors to a member or a student member of the Corporation who has distinguished theirself with impactful technical achievements. All nominees for this award shall be members in good standing, have at least one paper published or peer reviewed in Petrophysics, and have less than twelve years of experience in petrophysics for the exploitation and development of hydrocarbons and other mineral resources or for the alternative subsurface, at the date of the ceremony during the annual Symposium. Post-graduate work may count up to four years' experience. This award need not be awarded every year.

Section 5.
Award Nominations Process:

- The Awards Committee shall solicit documented nominations for award candidates from the membership and all Standing Committees.
- The Awards Committee shall meet to decide on recommendations for candidates for all awards except Outstanding Chapter and Outstanding Student Chapter, and transmit these recommendations to the Board of Directors.
- The Board of Directors shall decide on these recommendations at a meeting of the Board of Directors. The Board of Directors may grant additional Meritorious Service and Meritorious Technical Achievement awards without input from the Awards Committee, at any meeting of the Board of Directors. All the awards shall require the approval of at least one-half of the Board of Directors except for the Gold Medal for Technical Achievement and the Medal of Honor for Career Service, which shall each require at least the affirmative vote of two-thirds of the full Board of Directors. Members of the Board of Directors and the Awards Committee shall not be eligible for any award while serving on the Board of Directors or the Award Committee.

Section 6.
Presentation of Awards: All awards shall be presented at one or more functions held in conjunction with the Annual Meeting of the Corporation.

ARTICLE XI Conflict of Interest
Conflict of Interest: whenever a member of the Board of Directors has a financial or personal interest in any matter coming before the Board of Directors, the affected person shall (a) fully disclose the nature of the interest and (b) withdraw from discussion and voting on the matter. Any transaction or vote involving a potential conflict of interest shall be approved only when a majority of disinterested members of the board determine that it is in the best interest of the Corporation to do so. The minutes of meetings at which such votes are taken shall record such disclosure, abstention and rational for approval.

Amended Articles of Incorporation of the SOCIETY OF PETROPHYSICISTS and WELL LOG ANALYSTS, INC.

Article VI, Paragraph 5, Removed December 31, 1998, approved by Membership vote via mail
Article VI, Paragraph 5, Revised December 31, 1999 approved by Membership vote via mail
Article VI, Paragraph 1 and Article VI, Paragraph 7, Revised December 31, 2001 approved by Membership vote via mail
Article I, Revised May 23, 2003 Member vote via mail (Filed w/ Okla. 7/7/03)
Article V, Paragraph 1 and Sections 1, 2 and 3, Revised May 14, 2004 approved by Membership vote via mail
Article VI, Paragraph 7, Revised May 14, 2004 approved by Membership vote via mail
Article VI, Paragraph 7, Revised May 11, 2007 approved by Membership vote via mail

Article VI, Paragraph 2 and Paragraph 4, Revised March 2, 2018 approved by Membership vote via mail
Article V, Section(s) 2, 4, 5, 6 and 7, Revised, June 1, 2018 approved by Membership via electronic vote
Article VI, Paragraph 5, Paragraph 6 and Paragraph 7, Revised, June 1, 2018 approved by Membership via electronic vote
Article I, Revised September 19, 2019 approved by Membership via electronic vote
Article II, Revised September 19, 2019 approved by Membership via electronic vote
Article VI, Paragraph 1, 2, 3, 9, 10, and 12 Revised September 19, 20 approved by Membership via electronic vote
Article VI, Paragraph 4, 5, 6, 7, 8 13, 14 and 15 New September 19, 2019 approved by Membership via electronic vote
Article VIII, Paragraph 1 New September 19, 2019 approved by Membership via electronic vote
Article VI, Paragraph 1 December 21, 2020 approved by Membership via electronic vote
Article VI, Paragraph 3 December 21, 2020 approved by Membership via electronic vote
Article VI, Paragraph 4 December 21, 2020 approved by Membership via electronic vote
Article VI, Paragraph 10 December 21, 2020 approved by Membership via electronic vote

ARTICLE I

The name of this Corporation is SOCIETY OF PETROPHYSICISTS and WELL LOG ANALYSTS, INC. ("SPWLA")

ARTICLE II

The name and address of its registered agent in the State of Oklahoma is Statutory Representation, InCorp Services, Inc, Braniff Building, 324 North Robinson, Suite 100, Oklahoma City, Oklahoma 73102.

ARTICLE III

The duration of the Corporation is perpetual.

ARTICLE IV

The purpose or purposes for which the Corporation is formed are:

- **a.** Scientific;
- **b.** To advance the science of formation evaluation through well logging and other formation evaluation techniques; to develop the proper application of these techniques to the exploration for and exploitation of gas, oil, and other minerals; and to maintain high ethical standards of persons professionally engaged in these endeavors. In carrying out such purposes, the Corporation is authorized to act as Trustee of any funds or property that it may receive under specific or limited grants or agreements or under any will or in any other manner, and to have and exercise the right to hold and manage such funds or property under the terms or conditions imposed by any such trust, grant, agreement or will, insofar as such terms and/or conditions are within the scope of the purposes of the Corporation as herein described;
- **c.** To establish, erect, construct, lease, maintain, contribute to and support: schools, foundations, and colleges, or departments or divisions thereof, engaged in the teaching and study of the science of formation evaluation and to issue scholarships and grants for study at such institutions;
- **d.** To study, collect, preserve, and disseminate information among persons professionally engaged or interested in the science of formation evaluation;
- **e.** To establish, operate, and/or support libraries opened to persons engaged in or interested in the science of formation evaluation, and to contribute to general libraries for the purpose of enabling them to acquire material dealing with this science;
- **f.** It is the basic purpose and essential nature of this Corporation that it is organized and shall be operated exclusively for scientific purposes, and no part of the net earnings nor of the principal shall inure to the benefit of any private shareholder, member, director, or individual, and no part of the activities of this Corporation, or of any recipient of funds, shall be to carry on propaganda or otherwise to attempt to influence legislation within the meaning of U.S. Internal Revenue Code of 1954, Secs. 170 (c) (2), 501 (c) (3), 2055 (a) (2) and 2522 (a) (2), or any equivalent provisions and subsequent enactments. Provided, however, that reasonable compensation for personnel or professional services actually rendered as an employee or agent of this Corporation, and recompense for actual expenses incurred under authorization of the Board of Directors, may be paid to private individuals, and such private individuals shall not be disqualified to receive such compensation and/or recompense by the fact that they are members or directors of the Corporation;
- **g.** To acquire by purchase, grant, gift, will, lease, or otherwise, and to own, owe, control, administer, sell, exchange, lease, encumber, or otherwise dispose of, real, personal, or mixed property of every kind and description, for any of the uses or purposes of this Corporation;
- **h.** To have any and all other powers and to do any and all things which are incidental or necessary to or consistent with the accomplishment of any or all of the foregoing purposes.

ARTICLE V

This Corporation is formed exclusively for scientific purposes, and, therefore, has no stated capital and no capital stock. Each Member, Honorary Member and Senior Member shall have

one vote in the election of directors of the Corporation. All rights and powers vested in stockholders under the Oklahoma Business Corporation Act (18 O.S. 1961, Secs. 1.1 through 1.250), except those powers and rights which are inconsistent with the purposes of this Corporation as set forth in these Articles, shall be vested in the members of the Corporation. The following provisions shall govern the classifications, qualifications, privileges, election, change of classifications, reinstatement, ethics, and expulsions of members of this Corporation.

Section 1 – Classifications
Membership in the organization shall be divided into four categories on the basis of experience and degrees of participation. They shall consist of:

- Members
- Honorary Members
- Senior Members
- Student Members

Section 2 – Qualifications
Members
They shall have an active interest in formation evaluation.
Honorary Members
The Board of Directors may elect to honor Members who have made outstanding contributions to the cause or science of well log analysis by awarding them the classification of Honorary Members.
Senior Members
Senior Member status may be granted by the Board of Directors at the request of any Member who has attained the age of 60 and has been a member of the corporation for a minimum of 15 years.
Student Members
They shall be enrolled in a college or university satisfactory to the Board of Directors. No Student Member can keep this classification if not enrolled full time for at least 1 semester in a calendar year. Once dropping below the requirement for full time student, the Business Office will reclassify the Student as a Member and appropriate dues will be established.

Section 3 – Privileges
Members may vote and hold office, and hold committee membership on all committees.
Honorary Members may vote and hold office, and hold committee membership on all committees. They are exempt from payment of dues.
Senior Members may vote and hold office, and hold committee membership on all committees. Their dues are half of Member fee.
Student Members shall not vote or hold office or hold membership on any committee.

Section 4 – Application Process
A candidate for membership shall submit a formal application on a form authorized by the Board of Directors. The application shall be reviewed by the Business Office. Any irregularities in an application shall be brought to the attention of the Board of Directors. The approval of all members is at the discretion of the Board of Directors.

Section 5 – Change of Classification
The Board of Directors, generally at the request of the Executive Director, will change the classification of any member to conform to their current qualifications. Change of occupation does not disqualify a member classification once approved.

Section 6 – Ethics
All members must maintain the highest standards of business ethics, personal integrity, and professional conduct. They shall conform to the Articles of Incorporation and Bylaws of the Corporation.

Section 7 – Expulsions
Any member who, after due investigation, is found guilty of violating any of the standards prescribed in Section 6 of this Article may be suspended, reprimanded, allowed to resign, or expelled from the Corporation by the Board of Directors.

ARTICLE VI
The Board of Directors shall consist of the officers defined as President, President Elect, Vice President Technology, Vice President Technology Elect, Vice President Finance, Secretary and Administration, Vice President Education, Vice President Publication, Vice President Information Technology, Vice President Social Media and six Regional Directors. Not more than two representatives of any one company may serve as Officers on the Board of Directors during a given term. Regional Directors are excluded from this limitation. If two or more Regional Directors from the same company are serving terms that will carry over to the following year there shall be no more nominations for Regional Director from that company made by the nominating company. Directors shall not be officers of Chapters or Chapters-at-large, but may serve as officers of Special Interest Groups. The Board of Directors shall transact all business of the Corporation except as otherwise specified in these Articles of Incorporation. It shall approve all memberships in the Corporation, shall authorize all expenditures, shall direct investment of the Corporation funds, shall appoint the Nominating Committee, and shall approve and recommend all proposals for assessments against members. A majority affirmation vote of the Board of Directors shall be required for Board action except on matters otherwise specified.

Election of officers of the Corporation and Regional Directors of the Board of Directors, with the exception of the President and Vice President Technology, shall be conducted in the following

manner: By November 1st of each year, the Board of Directors shall appoint a Nominating Committee consisting of the Past President as chair and four members, each of whom must be a Member, Honorary Member or Senior Member of the Corporation. This committee shall nominate a slate of qualified candidates for the officers and Regional Directors whose terms are due to expire at the following Annual Meeting. They shall diligently seek two candidates for each office and shall nominate no more than one candidate per company for any one office except Regional Directors which may have two candidates per company. The nominating committee shall make reasonable efforts to have a diverse slate and shall not discriminate based on age, race, religion, gender, sexual orientation or geographical origin. The slate of candidates shall be delivered via letter mail, electronic mail, or other suitable means to the voting membership by February 1st.

In order to be eligible to vote in any given year, a member must have paid their annual dues by February 1st of that year.

Additional nominations may be made by submitting a petition signed by at least ten voting members, to the Nominating Committee within three weeks following publication of the Nominating Committee's slate of candidates. No single company shall have more than three candidates in the final slate of officers, excluding Regional Directors.

Nominees for Vice President Technology Elect shall have previous experience in a technical committee of SPWLA or sister organizations. In addition, the Vice President Technology Elect must have served for at least two years on the Technology Committee.

Nominees for Vice President Publication shall have previous experience as technical editor for a peer-reviewed journal and a minimum of two papers published in peer-reviewed journals.

Nominees for Vice President Information Technology shall have some experience on web standards and tools to regularly update and modernize the SPWLA website.

Nominees for Vice President Social Media shall be knowledgeable and active on social media channels.

All qualified candidates in the slate must have been a SPWLA member in good standing for at least three years and abide by the SPWLA Code of Ethics.

By March 1st, the Nominating Committee shall distribute an election ballot by letter mail, electronic mail or other suitable means to qualified voters of the Corporation. The officers of the Corporation and Regional Directors of the Board of Directors shall be elected by secret ballot.

Properly executed ballots must be available to the Executive Director by April 1st. Where more than two candidates for an office appear on the ballot, election shall be by simple plurality. Where there are only two candidates for an office, a simple majority of votes will control. Installation of the elected individuals shall be in the order of the officer listing in Article 1, Section 1 of the Corporation Bylaws. In each case where the election results for officers, excluding Regional Directors, cause a single company to be represented by more than two elected individuals, the elected individuals to the two highest offices shall be installed; each other office of the case shall be filled by the highest runner-up from a company not already represented. Hierarchy for Officers are:

1. President Elect
2. Vice President Technology
3. Vice President Finance, Secretary and Administration
4. Vice President Education
5. Vice President Publications
6. Vice President Information Technology
7. Vice President Social Media
8. Vice President Technology Elect

In each case of a tie vote involving two or more elected individuals, installation to office or offices shall be made holding a runoff election. If a tie vote results in the runoff, a secret vote will be carried out at the Annual Business meeting. The current Board of Directors and President can vote in such runoff election.

Counting of the ballots shall be done under the supervision of the Executive Director, Past President, and President. The results of the election shall be announced following the close of the polls by e-message to the membership and at the next Annual Meeting.

The terms of office shall be as follows: a. President, President Elect, Vice President Technology and Vice President Technology Elect: from one Annual Meeting to the next Annual Meeting b. Vice President Information Technology, Vice President Finance, Secretary and Administration, Vice President Social Media and three (3) Regional Directors: from one Annual Meeting in an odd-numbered year to the next Annual Meeting in an odd-numbered year c. Vice President Publications, Vice President Education, and three (3) Regional Directors: from one Annual Meeting in an even-numbered year to the next Annual Meeting in an even-numbered year.

~~The~~ Neither the Vice President Technology nor Vice President Technology Elect shall ~~not~~ publish papers as lead author or be the presenting co-author at the SPWLA Annual Symposium during their term to avoid conflicts of interest. However, the Vice President Technology and Vice President Technology Elect may still be a co-author on up to two papers presented at the symposium.

The Vice President Publications shall not publish papers in petrophysics during their term to avoid conflicts of interest.

A Director shall not serve on the Board for more than five consecutive years unless elected as President Elect or Vice President Technology Elect.

ARTICLE VII

This Corporation is a Corporation formed for scientific purposes, within the meaning of 18 O.S. 1961, Secs. 541-550, and therefore in the event of dissolution of this Corporation by lapse of time or otherwise, when it has the ownership of all the rights to any funds or property of any sort, real, personal, or mixed, such funds or property or rights thereto shall not be transferred to private ownership but shall be charged with a public trust and shall be thereafter administered and applied to the purposes enumerated in these Articles of Incorporation by a trustee or trustees appointed by the Board of Directors, or in the event of their failure to act, by a court of competent jurisdiction under suitable proceedings instituted for that purpose, or may, by majority vote of the members of the Corporation, by transferred in whole or in part to any foundation or other organization or trust generally dedicated to the purposes above set forth, or any of such purposes; provided, however, that such other foundation, organization, or trust generally dedicated to the purposes above set forth, or any of such purposes; provided, however, that such other foundation, organization, or trust to which such assets are transferred must be an entity qualifying as “scientific” as defined in U.S. Internal Revenue Code of 1954, Secs. 170 (c) (2), 501 (c) (3), 2055 (a) (2) and 2522 (a) (2), or equivalent provisions in succeeding enactments. No amendment of the Articles of Incorporation of this Corporation shall ever include any purpose or power to engage in any activity inconsistent with its character as a scientific Corporation.

ARTICLE VIII

The email address of the primary contact for the registered business is sharon@spwla.org.
The governing body of the Corporation adopted a resolution setting forth the amendments proposed and declaring their advisability. At a subsequent meeting held upon notice stating the purpose thereof and given in accordance with the provisions of Title 18, Section 1067, a majority of all the members of the governing body voted in favor of the amendments.

ABERDEEN FORMATION EVALUATION SOCIETY (AFES)

General News

AFES has events planned and also in the planning stages for the autumn and winter period 2022 into 2023. Please check our website (www.afes.org.uk) or contact Greg Blower @ President@afes.org.uk for details. We are also available on Facebook and Linkedin.

Recent Events

DEVEX 2022 – AFES, along with PESG and SPE, produce the Aberdeen-based DEVEX conference each year. DEVEX 2022 was held in Aberdeen in early May this year. It was the first physical event in 2 years and was well attended. Planning for DEVEX 2023 begins in early September 2022.

25 May 2022—AFES hosted SPWLA Distinguished Speaker Supriya Sinha (Halliburton). The talk was titled "Real-Time 3D Imaging of Complex Turbiditic Reservoir Architecture." This was AFES's first physical event post-pandemic. The event was well attended.

12 July 2022—Field Trip: The AFES was delighted to present its annual Summer Social/Field Trip. The Field Trip focused on the exposures north of Stonehaven town (near Aberdeen) to see Devonian fluvial rocks, the Highland Border Complex, and Highland Boundary Fault. Many thanks to AFES's Stephen Morris for organizing and hosting the event. The planning of the event even included the weather, having one of the best evenings of the summer. Fish and chips followed, eaten on the beachfront at Stonehaven.

27 July 2022—We held an Evening AFES Technical Talk hosting Adrian Leech (GAIA) on "Optimizing Well Design for Wireline Operations." Again, this was an actual event, held at AFES's usual city center venue. The event was well attended. Special thanks to Adrian Leech (Gaia Energy Group) for making exceptional efforts to be present at the event due to local flight/airport issues in the UK.

31 August 2022—A Technical Talk was presented by Amin Sharifi (ABERDEEN UNI) on "Optimizing Horizontal Well Trajectory: Interaction of Hydraulic Fractures and Natural Fractures."

Upcoming Events

21 September 2022—Technical Talk: Jamie Miller (GEODYNAMICS) on "A Case Study on Clean-Tunnel Perforating Technology ConneX."

12 October 2022—Technical Talk: Ehsan Nikjoo (RESMAN) on "Effective Production and Reservoir Management Using Inflow and Interwell Tracers."

23 November 2022—Technical Talk: Alan Walsh (ANSA) will present. Title TBD.

December 2022—Xmas Quiz for Archie Foundation… planning in progress…

Finally, AFES would like to thank its ongoing sponsors:

ALTUS Intervention Weatherford Gaia GEODynamics ANSA

ACOUSTIC SIG

General News

During the last 4 months, we have had SIG board and workshop planning meetings on April 22, May 11, July 1, and July 29. During this time, we have:

- We developed, approved, and submitted our new Acoustic SIG Bylaws to SPWLA.
- Executed the plans to advertise, recruit presenters, and deliver the Acoustic SIG Workshop "Borehole Acoustics: The Road Ahead." Our efforts attracted 20 abstract submissions to our workshop. We expect at least 40 participants.
- Recruited several speakers for our upcoming bimonthly acoustic virtual seminar series, which will use the same system used for SPWLA webinars.
- Developed a LinkedIn Acoustic SIG group to facilitate communication and engagement with the industry.
- Developed email tools that have facilitated communication between SIG members and the board.
- Developed a new logo for marketing our SIG.
- Continued modernizing the Acoustic SIG website Acoustics (spwla.org).

Upcoming Events

2 September 2022—Acoustic SIG Workshop on "Borehole Acoustics: The Road Ahead." This event will be held at Chevron, 1400 Smith Street, Houston, Texas. This is a 1-mile walk through downtown Houston from the IMAGE Conference at the George Brown Convention Center. This workshop has peer-reviewed presentations as well as a panel discussion led by operator companies to discuss "the road ahead" for borehole acoustics. Registration.

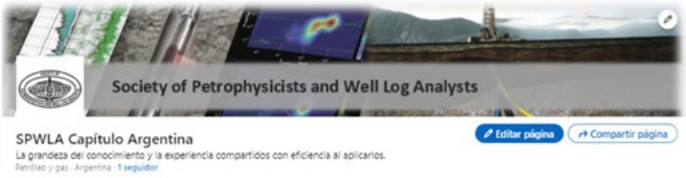
29 September 2022—Acoustic SIG Bi-Monthly Seminar Series: Brian Hornby (Hornby Geophysical Services) will present "The Road to Achieve Business Value From Borehole Sonic Imaging." Registration.

ARGENTINA CHAPTER

General News

This committee has been meeting bimonthly during 2021, and we plan to continue with these meetings during 2022, where ideas arise to be developed in the chapter. We have identified new high spots:

1) Media Team: In order to improve our visibility, we are working on our LinkedIn account. We updated our profile languages (Spanish and English), and we created an "enterprise account" for our chapter.
2) In August 2022, we launched it, inviting all our contacts to enjoy this new version of us.



3) New institutional email: Argentina.chapter@spwla.org.
4) Education Team: We are inviting all novice professionals or advanced students to join us who want to present a thesis or final working order to make themselves more visible for future jobs.

Event videos that are available @ our YouTube channel:

Analysis of Petrophysical Properties in Organic Mudstones Applying Digital Rock Physics: A Case in the Middle Magdalena Valley, Colombia, María Florencia Segovia (Ecopetrol), December 3, 2021, **https://youtu.be/HG8YIGHA50g**.

Challenges and Strategies in the Geosteering of Unconventional Reservoirs, Gustavo Magenta / José Viramonte and Matías Cáneva (YPF, S.A.), October 13, 2021, **https://youtu.be/IFpVr7C0wWY**.

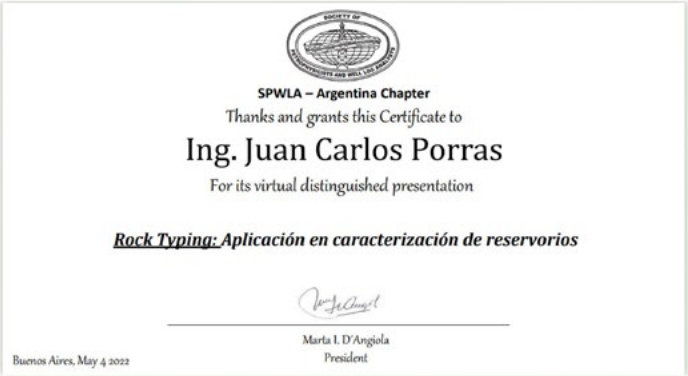
The Benefits and Dangers of Using Artificial Intelligence in Petrophysics. Steve Cuddy (Petro-Innovations, UK), July 5, 2021, **https://youtu.be/1FqkDoeCbJU**.

A Post-Graduate Training Experience Abroad. Sedimentology and Geochemistry of a Tropical Beach of the Ordovician of New York, Josefina Vizcaino, August 4, 2021, **https://youtu.be/NxYilW10xQw** and **https://youtu.be/C_h4V26E9h4** .

Rock Typing, Application in Reservoir Characterization, Juan Carlos Porras, May 4, 2022, **https://lnkd.in/ddvTCPT5**.

Recent Events

4 May 2022—Open Talks Cycle, Rock Typing, Application in Reservoir Characterization.


SPWLA – Argentina Chapter

Thanks and grants this Certificate to

Ing. Juan Carlos Porras

For its virtual distinguished presentation

Rock Typing: Aplicación en caracterización de reservorios

Marta I. D'Angiola
President

Buenos Aires, May 4 2022

Summary: The rock typing methodology allows establishing the geometry of the porous system of the reservoirs. It is fundamentally based on the determination of lithofacies or rock types and their application in reservoir characterization, through the analysis of capillary pressure curves by mercury injection, incorporating the analysis of the complex variations in the geometry of the pores and throats of pores that control the initial and residual distribution of fluids, and their flow through the reservoir. The relationship between rock types, water saturation, and height above free-water level (FWL) is of vital importance for the understanding of reservoirs.

27 July 2022—We met via Teams with our Regional Director Nelson Suarez Arcano. We introduced each other and started to build a strong Latin America team between the Colombia, Brazil, and Argentina Chapters. We plan to strengthen ties and develop joint activities synergistically.

4 August 2022—First chapter meeting in person. After such a long and hard pandemic time, we met again and had a coffee.

(From left to right) Eduardo Breda (Chapter Past President), Mario Outon (member), Marta D'Angiola (Chapter President), Isabel Cano Frers (member), and Lorena Caviglia (Chapter Secretary).

Upcoming Events

An "interest topics" survey was done last quarter among our community members. As a result of this exercise, we are planning to focus our future activities on the following topics:

- Alternative Energies: Geothermal Energy
- Lithium as a Strategic Resource and Associated Petrophysics
- Environment topics: CO_2, H, etc.

BOREHOLE IMAGING (BHI SIG)

General News

Since the establishment of the BHI SIG earlier this year, we have registered over 100 new members and highly appreciate the interest in this topic. We are currently planning our fall members meeting and are intensifying our efforts to discuss our topics with operators and other users of BHI data to gain more awareness and interest.

For the 2023 SPWLA Annual Symposium, we are applying for a special session about case studies and additional applications of BHI data. Furthermore, we plan to give a workshop at the 2023 Annual Symposium.

Upcoming Events

October 2022–Member meeting TBD. Invitation will be sent out soon.

BRAZIL CHAPTER

General News

Our monthly meetings are being held online every third Tuesday of the month at 4 pm (Brasilia Time). Anyone wishing to participate is welcomed. We also post chapter updates and meeting links on our LinkedIn page (SPWLA Brazil Chapter). Check us out. For further information about the chapter, please contact our secretary, Leonardo Gonçalves (leonardo.g@petrobras.com.br). Membership in our chapter is free and can be claimed by filling out the form available at https://lnkd.in/g4KQjYf. Meetings are held in Portuguese or English, depending on the preference of the speaker. Even if it is held in Portuguese, questions in English are also welcomed!

Recent Events

21 June 2022—We had Artur Posenato, research petrophysicist/earth scientist (Chevron ETC, Houston). The talk entitled "Improved Interpretation of Electrical Resistivity Measurements in Mixed-Wet Rocks" discussed resistivity in mixed wettability rocks, an important topic in presalt carbonates.

Invitation to June monthly meeting of the SPWLA Brazil Chapter.

19 July 2022—We hosted Cayo Pontes, who has a BSc degree in geology and an MSc degree in petroleum and mineral exploration with an emphasis on structural, geomechanical, and petrophysical analysis of brittle structures. The talk entitled "Influence of Strain Bands in Oil Reservoirs, Focusing on Geomechanical and Petrophysical Properties" discussed how structural features of reservoirs could influence formation evaluation and provide essential geomechanical and petrophysical inputs.

Invitation to July monthly meeting of the SPWLA Brazil Chapter.

16 August 2022—We hosted Juan Carlos Porras who presented "Rock Typing: Application in Reservoir Characterization." Juan Carlos is the director and senior specialist in petrophysics and subsurface data integration (Inter Rock).

Invitation to August monthly meeting of the SPWLA Brazil Chapter.

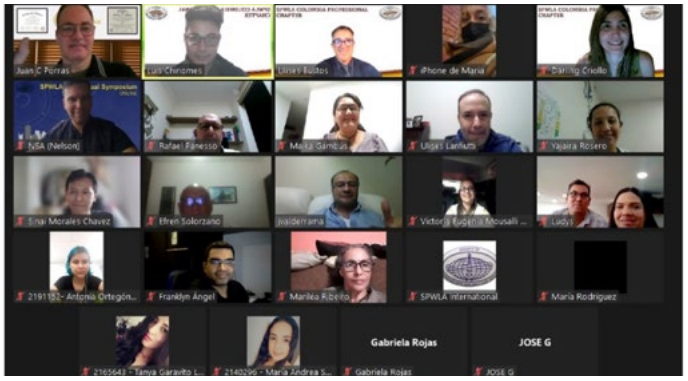
COLOMBIA CHAPTER

Board of Directors

Miembro	Cargo SPWLA COL	Empresa	Linkedin
Maria Florencia Segovia	President	Ecopetrol	https://www.linkedin.com/in/maria-florencia-segovia-64bba933/
Ulises Bustos	Vice President	Schlumberger	https://www.linkedin.com/in/ulises-bustos-33538465/
Darling Criollo	Secretary	Halliburton	https://www.linkedin.com/in/darling-criollo-9b502933/
Maria Isabel Sandoval	Treasurer	UIS	https://www.linkedin.com/in/maria-isabel-sandoval-martinez-8aa40663/
Maika Gambús Ordaz	Vocal1	UIS	https://www.linkedin.com/in/maika-gambus-1a925443/
Victoria Mousalli	Vocal2	UIS	https://www.linkedin.com/in/victoria-mousalli-26171655/

Recent Events

27 July 2022—The SPWLA Colombia Chapter held together with the SPWLA UIS Student Chapter an event entitled "Application of Rock Typing Methodology in Reservoir Characterization" by MSc Juan Carlos Porras, co-founder and director (Inter Rock C.A.). The event was held via the Zoom platform. During the webinar, we had an audience of 48 people from different countries, 65% of them from Colombia and the rest from Latin American countries and the USA. At the end of the event, we were happy to see some of them posing for a photo.



The SPWLA Colombia Chapter met with the new Regional Director of Latin America, Nelson Suarez, to socialize about new projects and what the chapter needs to carry them out.

The SPWLA Colombia Chapter continues to have weekly meetings to coordinate the technical issues to be presented and the activities for the year 2022.

Upcoming Events

September 2022—SPWLA Colombia, in conjunction with SPWLA Argentina, will organize a series of conferences on energy transition.

Click on the following link to see our events:

https://www.youtube.com/channel/UC5Yl9IYkWN9d767n2aj6H_w

DUBAI CHAPTER

General News

Dubai Chapter continues with online meetings during 2022. Anyone interested is welcome to visit our profile on LinkedIn SPWLA Dubai Chapter or email us at dubai@spwla.org to join our virtual events and ask any questions regarding our chapter.

As the Dubai Chapter says farewell to our VP Marvin Rourke, we also welcome the newest member of the board, Dr. Ihsan Gok, who will serve as IT Coordinator.

Recent Events

29 June 2022—The second presentation of 2022 was held. Mr. Gok conveyed the importance of production logging for wells that identify fluid entry points and diagnose problems in production. This very interesting and concise presentation garnered a few questions from the audience at the end.

31 August 2022—Raghu Ramamoorthy presented "Towards a Petrophysically Consistent Implementation of Archie's Equation for Heterogeneous Carbonate Rocks."

EAST CHINA CHAPTER

Recent Events

A series of academic exchanges were presided over by the East China Chapter of SPWLA (ECC-SPWLA) during June and July to promote the development of well logging and provide a communication platform for researchers. The ECC-SPWLA invited Professor Li Ning, Professor Han Dehua, and Dr. Zhang Chi to give talks. Their reports attracted innumerable relevant practitioners in borehole geophysics to attend the event and gave valuable comments.

25 July 2022—Professor Li Ning delivered a report on well-logging methods and processing software. Professor Li Ning is an academician from the Chinese Academy of Engineering who graduated from the China University of Petroleum (East China) in 1977. He, as the former Chief Expert of CNPC Research Institute of Engineering Technology, is specialized in borehole geophysics theory researching, building well-logging evaluation systems for complex reservoirs, and large-scale logging software development, where he also made outstanding contributions.

Professor Li Ning delivered a report at the Huangdao Forum.

Professor Li's report started with his personal experience with the NMR well-logging method. He mentioned that well logging is a field of intensive high-tech applications. To develop and expand the subject of well logging, first of all, the scholars must establish the concept that there is no distinction between subjects, and every subject is equally important. Secondly, scholars must pay attention to the research and development of the original core technologies, especially in the field of theoretical and methodological research.

In the next part of the report, he elaborated on how to develop and expand the well-logging subject. Professor Li showed his own insights and three suggestions. The first suggestion is to regard borehole geophysics as an independent subject and develop it. The second suggestion is to build two centers. One is the China petroleum exploration and production research institute, which is critical for theoretical method research, well-logging software development, and interpretation, and the other is CNPC logging Co., Ltd, which serves as the core of instrument manufacturing and oilfield service. The last suggestion is to build the third-generation well-logging instrument and software of CIFLog 4.0.

Teachers and students participate in the Huangdao Forum.

CIFLog is a large-scale logging processing and interpretation software platform developed by Professor Li, with completely independent intellectual property rights of CNPC Research Institute of Engineering Technology. According to Professor Li during his introduction, the most distinctive function of the software is the imaging logging processing method and the well-logging evaluation technology system for complex reservoirs. The software can achieve the high-definition imaging of electrical imaging logging in the whole borehole, which makes it at the world's leading level. Apart from the electrical imaging logging, the data processing method of CIFlog is in array acoustic imaging well logging, NMR, and formation element capture logging. In the aspect of oilfield block evaluation, the software realized the deep integration of single-well interpretation and oilfield multiwell evaluation, enabling the conventional multiwell evaluation to turn into a block risk exploration evaluation. Especially in the condition of horizontal wells, CIFlog made several breakthroughs in the key of horizontal well-logging data processing, such as fast-forward modeling of LWD, 3D horizontal well attribute modeling, and borehole environment correction. At present, CIFLog has been widely used in more than 50 overseas operating areas of CNPC and 13 countries, such as Kazakhstan, Iran, and Sudan. More than 20,000 wells have been processed annually.

At the end of the report, Professor Li had some discussions with participants and took the development experience of CIFlog as an example to encourage us.

28 June 2022—Dr. Zhang Chi from the University of Vienna delivered an online report, namely the "Critical Zone Geophysics – Importance and Applications." More than 200 people attended the online event. Dr. Zhang is a hydro-geophysicist studying complex fluid-rock interactions using geoelectrics, nuclear magnetic resonance, and modeling tools. Before joining the University of Vienna, she was an assistant professor in the Department of Geology at the University of Kansas. She is interested in studying the tightly coupled physical, chemical, and biological processes that govern the behaviors of geologic media and their constituent fluids (water, brine, CO_2, and hydrocarbons) on the microscale to macroscale. Currently, Chi studies water distribution, weathering, and geochemical fluxes in carbonate rocks.

Dr. Zhang Chi gave a presentation online.

Dr. Zhang's report starts with the role of geophysics in many scientific and societal challenges. Then, she introduced the critical zone geophysics. Moreover, she focused on the carbonated critical zone and its importance and introduced the advanced work on carbonate critical zone geophysics in her research group. Her report featured the importance and role of geophysical methods in the critical zone. Methods

have been extensively applied to the critical zone evaluation, including ground-penetrating radar, electromagnetics, nuclear magnetic resonance, electrical resistivity methods, self-potential methods, as well as distributed temperature sensing methods. Many case studies all over the world were presented to inform us on how to figure out the underground water content and its spatial distribution. At the end of the speech, Dr. Zhang also listed some remaining science questions which should be taken seriously. For example, where is the base of the critical zone in a karst system? How is the carbonate critical zone different in the Alpine region? How do lithology and rock-fluid interactions impact the subsurface architectures? What are the impacts of structural heterogeneity on flow and transport on a different scale? It was a fascinating report for teachers and students whose research is focused on the detection and evaluation of fossil fuels.

21 June 2022—Professor Han Dehua from the University of Houston gave an online lecture entitled "Geophysical Exploration of Oil and Gas Fields in Deep and Ultradeep Water." Famous experts and scholars from China Petroleum University (East China) and China University of Mining and Technology attended the event. Professor Han Dehua is an internationally renowned petrophysicist who graduated from Stanford University and has been engaged in petrophysics research for more than 40 years. He has made numerous achievements in the study of the effects of porosity, fluid, etc., on the physical properties of rocks.

The online meeting in China University Petroleum (East China).

This was a wonderful lecture. Profesoor Han focused on oil and gas fields in deep and ultradeep water. His lecture had four sections with themes of scientific conceptions for complicated geosystems, seismic properties of shale resource rocks, evaluation of shale reservoirs, and exploration of hydrocarbon reservoirs in ultradepth. In the lecture, Professor Han explained the significance of exploring complex reservoirs and unconventional reservoirs. He also called on the current logging community to pay attention to geological knowledge and to focus on not only the present but also the past. After the lecture, the attending experts and scholars also exchanged their academic opinions and discussed with Professor Han the logging evaluation of complex reservoirs and unconventional reservoirs.

Complex and unconventional reservoirs are difficult and hot issues in petroleum exploration and development, which also pose a great challenge to the logging detection and evaluation technology. This lecture offered a favorable communication platform for industry peers to summarize their experiences and enhance the consensus. Moreover, this lecture is of great significance in promoting the rapid improvement of logging technology level and the development of the discipline.

Upcoming Events

3–5 November 2022—The 13th UPC International Symposium on New Well-Logging Techniques will be held in Qingdao. This symposium will focus on the frontiers and challenges of electric-logging technology and covers novel techniques in other logging methods.

Conference Topics:

1. LWD Electric Logging Technology and Geosteering Application
2. Simulation and Inversion of Electric Logging Data of High-Angle and Horizontal Wells
3. New Technology and Application of Electric Logging for Cased/Wireline Well
4. Crosswell or Borehole-Ground Exploration Methods With Electromagnetic Waves
5. The Application of Artificial Intelligence Technology in Well Logging
6. Advanced Petrophysical Measurements and Formation Evaluation
7. Other Well-Logging Technologies and Applications

Important deadlines:

- Abstract: September 15, 2022. Submit to gexinmin2002@upc.edu.cn.
- Final manuscript: October 15, 2022. Submit to leiwang1989@upc.edu.cn.

HOUSTON CHAPTER

General News

The Houston Chapter of SPWLA successfully organized its board elections. We congratulate the newly elected 2022–2024 board members and thank/honor our outgoing board members.

SPWLA Houston continues to organize and support many exciting and fun activities for our members. Recently, we organized one technical seminar with **Bjørn Dybdahl** (Expro). The seminar was held online on June 23. We want to sincerely thank the speaker for his excellent talk. We thank all the attendees and participants for making the event successful and Q&A sessions lively and dynamic.

We are glad to continue our in-person events. A social networking event was also hosted in Houston on July 14. The entire SPWLA community was invited. The event was the last in-person social networking event hosted by the outgoing chapter board and the elected board.

We work diligently to bring the best speakers for you, and we are looking forward to seeing you again at our upcoming events and activities.

If you would like to receive notifications of upcoming events and chapter news, please register on the new SPWLA Houston Chapter website and follow us on LinkedIn. Additionally, there are multiple exciting sponsorship opportunities and job postings announced there. Please reach out to us in case you are interested or if you would like to receive additional information. As always, we are open to new speakers in our seminars, and we look forward to bringing other guests in addition to our SPWLA DS if the topic interests the petrophysics audience. Contact our VPs in case you have a presentation you would like to share.

Please stay tuned and check it out for upcoming news! As always, feel free to contact any of the board members if you have any questions or comments using our contacts included below.

Recent Events

SPWLA Houston Chapter June Lunch Seminar

23 June 2022—SPWLA Houston Chapter recently organized a lunch seminar with **Bjørn Dybdahl** (Expro) titled "Bridging the Gap Between Reservoir and Sample; Reducing Asset Development Risk by Using Downhole Mercury Trapping and Nonreactive Sampler for Trace Component Sampling." We would like to thank Bjørn for presenting his work to our chapter members and other attendees who were interested in the topic.

SPWLA Houston Chapter Social Networking

14 July 2022—The Houston Chapter of SPWLA hosted a social networking event. The event was the last in-person social networking event hosted by the outgoing chapter board and the elected board. The entire SPWLA community was invited. Attendants had a great time meeting with chapter members, including experienced SPWLA members.

Upcoming Events

14 September 2022—Lunch Seminar and Lab Tour from 11:30 am–1:00 pm.

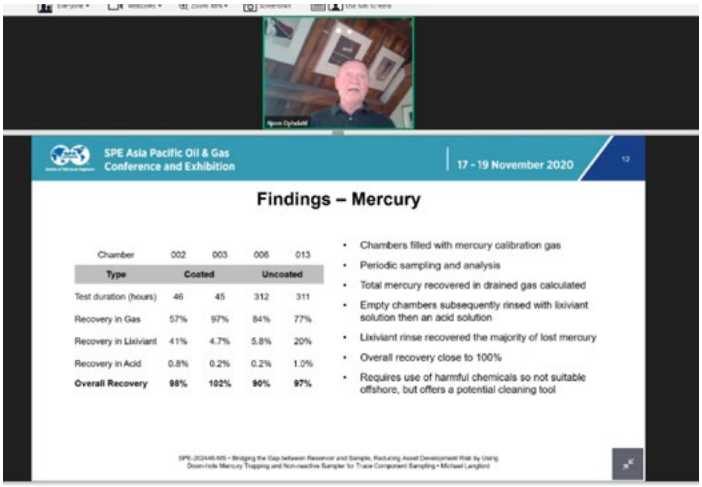
STRATUM RESERVOIR: SOLVING CO_2 SEQUESTRATION CHALLENGES

Speaker: Dr. Jennifer Adams (Stratum Reservoir)

The presentation will be followed by a **30-minute tour** of the onsite Stratum labs for those interested in staying on. This activity includes a boxed lunch. This event is sponsored by **STRATUM** and has no charge for registration. However, you still need to register using the applicable links below.

Registration Link: https://spwla-houston.org/seminar-detail.php?id=50

More details are available on the Houston Chapter's website: https://www.spwla-houston.org/
and the Houston Chapter LinkedIn profile: https://www.linkedin.com/company/houston-chapter-of-spwla/.



Bjørn Dybdahl (Expro) made his insightful technical talk online about bridging the gap between the reservoir and sample.

The attendees of the social networking event had a great time together.

The event was an excellent chance for the chapter members to talk and also meet experienced SPWLA members, including the 2018–2019 SPWLA President Zhipeng "Z" Liu and the 2019–2020 SPWLA President Jesus Salazar.

SPWLA Houston Chapter Board for 2022–2024

 **Bernd Ruehlicke** **PRESIDENT** president@spwla-houston.org	 Amer Hanif **VICE-PRESIDENT NORTH SIDE** vpnorthside@spwla-houston.org
 **Artur Posenato Garcia** **VICE-PRESIDENT DOWNTOWN** vpdowntown@spwla-houston.org	 **Neal Cameron** **VICE-PRESIDENT WESTSIDE** vpwestside@spwla-houston.org
 **Ronke Olutola** **TREASURER** treasurer@spwla-houston.org	 **Hans Wong** **SECRETARY** secretary@spwla-houston.org
 **QinShan (Shan) Yang** **EDITOR** editor@spwla-houston.org	 **Tianmin Jiang** **WEBMASTER** webmaster@spwla-houston.org

IGUP STUDENT CHAPTER-PAKISTAN

General News

SPWLA IGUP Student Chapter-Pakistan is planning to organize an extensive meeting to discuss and finalize the next year's targets. In addition to this, SPWLA IGUP Student Chapter-Pakistan arranged the last meeting with our faculty advisor to close the paperwork and finalize the election date for electing the board of directors for the upcoming year.

Boards of Directors (2021–22)

The names of the elected board of directors with their designation and contact details are as follows:

Dr. Muhammad Armaghan Faisal Miraj armghan.geo@pu.edu.pk	Faculty Advisor
Miss Maha Ali Haider mahaalihaider26@gmail.com	President
Mr. Shan Shahzad shan.mphil.geo@pu.edu.pk	Vice-President
Miss Pal Washa Shahzad Rathore palwashashahzad97@gmail.com	Treasurer
Miss Ayesha Ejaz ayesha.mphil.geo@pu.edu.pk	International Relations Chairperson
Mr. Muhammad Hamza hamza-930233@pu.edu.pk	Membership Chairperson
Mr. Muhammad Waqas Javed geo747@outlook.com	Event Manager

Recent Events

1 August 2022—An election was held to elect the new board of directors. Faculty advisor, previous team members, and all members of SPWLA IGUP Student Chapter-Pakistan were part of that election. The details of the elected team members for the upcoming year are as follows:

Board of Directors of SPWLA IGUP Student Chapter-Pakistan (2022–23).

Upcoming Events

SPWLA IGUP Student Chapter Pakistan is planning to organize a webinar for students in the next month. More details about upcoming events will be updated on our social pages:

LinkedIn: https://www.linkedin.com/in/spwla-igup-student-chapter-pakistan-57b116219/
Facebook: https://www.facebook.com/SPWLA-IGUP-Pakistan-107338908181070
Contact Details: spwla.igup.pak@gmail.com

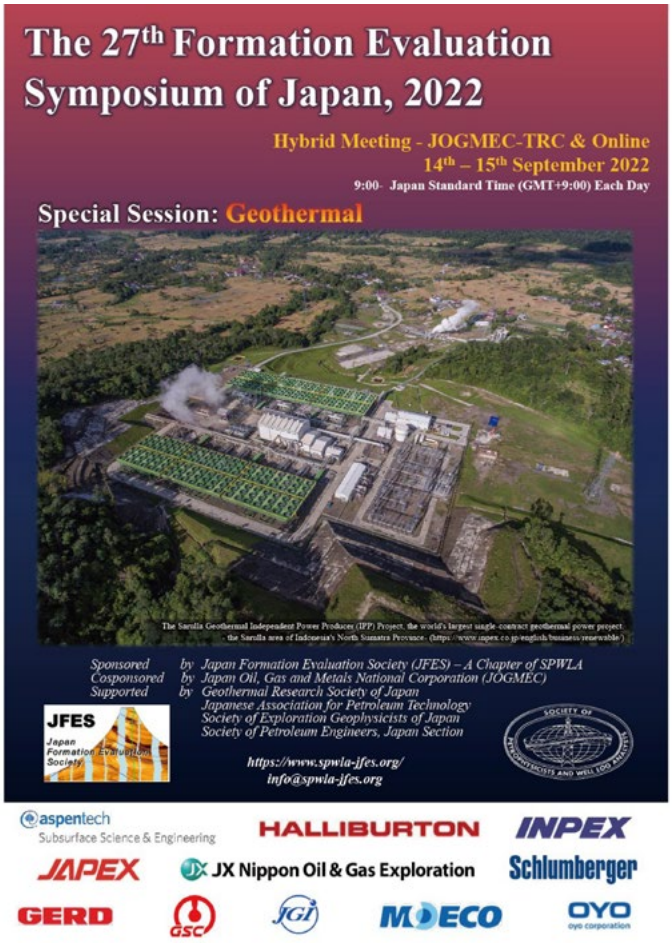
JAPAN CHAPTER
(JAPAN FORMATION EVALUATION SOCIETY, JFES)

Recent Events

26 July 2022—The 118th JFES Chapter Meeting was held online: https://www.spwla-jfes.org/118th-jfes-chapter-meeting/. The meeting had 74 participants, and a lively discussion was held with speakers.

Upcoming Events

14–15 September 2022—The 27th Formation Evaluation Symposium of Japan will be held as an online event. Geothermal is a special session. Eight special speakers are invited to this symposium. Click here for registration, technical program, and details: https://www.spwla-jfes.org/ja/the-27th-jfes-annual-symposium/



NORWEGIAN FORMATION EVALUATION SOCIETY (NFES)

General News

After the successful but tiring 63d SPWLA Symposium we hosted in Stavanger, the board is enjoying the rest. The 2022/2023 season starts with September's board and technical meetings.

Upcoming Events

1–2 November 2022—If you miss Stavanger already, this fall, NFES and NORCE are organizing an international **Geosteering and Formation Evaluation Workshop**.

In 2019, the event gathered nearly 100 geoscientists from operating and service companies and academia. The event provided an excellent opportunity to exchange knowledge and network with a broad audience in geosteering, formation evaluation, uncertainty analysis, and decision-making. Over 85% of the participants look forward to the next event, and 95% recommend others to join: https://geosteering.no/gsfe-feedback/.

This time, we are planning five invited presentations, five plenary topics, one extended poster session, as well as a geosteering competition, quiz, dinner, and other social activities.

The invited speakers are:

- Pete Heavey (Aker BP, Norway): "An Operator's Perspective on the Geosteering Journey, and Where Next?"
- David Selvåg Larsen (Vår Energi, Norway): "Advanced Geosteering Workflows on the Norwegian Continental Shelf."
- Kelli Randall (Chevron Technical Center, USA): "Data Liberation Driving Efficiency and Innovation in Geosteering."
- David Pardo (University of the Basque Country, Spain): "Machine Learning for Modeling and Interpreting Log Measurements."
- Miklos Antics (GPC IP / GEOFLUID, EGEC, France): "Geosteering Geothermal Wells."

Abstract submission is open at the event page: https://digiwells.no/events/geosteering-2022.

Contributed session topics:

- Geosteering Workflows and Their Applications: Prejob, Real Time, Post-job
- Optimization and Decision-Making in Geosteering
- Advanced Formation Evaluation for Reduction of Subsurface Uncertainty
- Resistivity Inversion 1,2,3D and Data Fusion/Integration
- Applications of Geosteering in Geothermal and Civil Wells

We look forward to your active participation by submitting an abstract and joining the event. Sponsorship and exhibition opportunities are available.

Organizing Committee:

- **Sergey Alyaev** (senior research scientist, NORCE; VP Academia, NFES), saly@norceresearch.no
- **Alexandra Zaputlyaeva** (business development manager, ROGII Inc), a.zaputlyaeva@rogii.com
- **Dier Mirza** (lead petrophysicist, Aker BP; VP Member, NFES), vp_member@nfes.org

Technical Committee:

- Frank Antonsen (specialist petrophysics, Equinor)
- Nigel Clegg (geosteering team leader, Halliburton)
- Jean Michel Denichou (well construction measurement, Schlumberger)
- Igor Kuvaev (CTO, ROGII Inc.)
- David Holbrough (global discipline lead – well construction, Baker Hughes)
- Nils Andre Aarseth (chief petrophysicist, Aker BP)
- Maurizio Mele (production geology and petrophysics knowledge owner, Eni S.p.A.)

The organizing and technical committees from 2019 wish you the same excellent weather in Stavanger in the coming November.

PERMIAN BASIN CHAPTER

General News

We welcome three new board members who joined in August 2022.

- Christopher Smith (Advanced Hydrocarbon Stratigraphy), Vice President
- Sebastian Ramiro-Ramirez (Diamondback Energy), Treasurer
- Jennifer Reeves (Applied Petroleum Technology (APT)), Secretary

These new board members will be joining our current board members:

- Veronica Montoya (Axiom Petrophysics LLC), President
- Islam Mitwally (FractureID), Social Media Communications

Recent Events

Past Monthly Topics:

Date	Speaker	Title
May 24, 2022	Mohammad Azeem Chohan	Integrated Petrophysical Evaluation of Unconventional Formations in the Delaware Basin, With a Customized NMR Acquisition
August 23, 2022	Sabyasachi Dash	Enhanced Assessment of Fluid Saturation in the Wolfcamp Formation of the Permian Basin

Upcoming Events

26–28 September 2022—Permian Basin SPWLA is partnering with the professional and student chapters in Argentina, Colombia, and Brazil to present a three-day Virtual Student Symposium, where professionals will present to students about various aspects of unconventional plays. Thanks to Clara Palencia (Intertek Westport Technology Center based in Houston, Texas), who is organizing this event.

Last Monthly Meeting of 2022:

Date	Speaker	Title
October 25, 2022 (Virtual)	TBD	TBD

UIS Student Chapter (Colombia)

Board of Directors

President:	Anngy Daniela Román O. (presidencia@spwlauis.com)
Vice President:	Karen Julieth Rojas O. (vicepresidencia.spwlauis@gmail.com)
Fiscal:	Julian David Anaya F. (fiscal.spwlauis@gmail.com)
Secretary:	Silvia Juliana Franco A. (secretaria.spwlauis@gmail.com)
Treasurer:	Lizeth Vanessa Blanco D. (contador.spwlauis@gmail.com)

Recent Events

The UIS Student Chapter organized an integration meeting among its members (team, board of directors, and advisors) to celebrate the **"Outstanding Student Chapter Award"** we received, as well as say goodbye to the old board and welcome the new board of directors. We also took the opportunity to celebrate member birthdays.

The UIS Student Chapter published its second podcast entitled “Experiences With Fellow Oil Workers Abroad With Samuel Fontalvo Guzman.” Samuel recounted the challenges he had to go through to be in Saudi Arabia and how his experience has been in this foreign country.

The UIS Student Chapter began the process of calls to encourage students to be part of a student chapter that promotes knowledge and science in areas of petrophysics, in addition to generating spaces for developing skills that contribute to personal and professional growth.

The SPWLA UIS Student Chapter worked with the SPWLA Brazil, Peru, and Argentina Chapters in an event called “Unconventional Resources Present and Future,” featuring “Four Countries’ Stories.”

Upcoming Events

October 2022—The SPWLA UIS Student Chapter will conduct a drilling sludge course.

October 2022—In the first few weeks of October, the SPWLA UIS Student Chapter will offer a petrophysics course with engineer Nelson Suarez.

SPWLA UIS/ Social Networks

LinkedIn:
https://www.linkedin.com/company/spwla-uis-student-chapter/
Instagram:
https://www.instagram.com/spwlauis/?hl=es-la
YouTube:
https://www.youtube.com/c/SPWLAUIS
Facebook:
https://es-la.facebook.com/SPWLAUIS/

Welcome New Members – June 11, 2022–August 15, 2022

Abbasi, Jassem, University of Stavanger, Stavanger, Norway
Ahmad, Sayyid, Halliburton, Klofta, Ullensaker, Norway
Al Gawish, Mohamed, Halliburton, Aberdeen, United Kingdom
Aleixo, Renee, Aker BP, Stavanger, Norway
Alemu, Binyam, Aker BP, Sola, Rogland, Norway
Belenguer, Rose-marie, Totalenergies, Paris, France
Benslimane, Salma, Schlumberger, Menlo Park, CA, United States
Bettinelli, Pierre, Schlumberger, Bucharest, Romania
Beyer, Katharina, Schlumberger, Tananger, Rogaland, Norway
Birkedal, Knut Arne, Aker BP, Stavanger, Norway
Chawshin, Kurdistan, Prores AS, Trondheim, Norway
D'Arcy, Boris, OKEA, London, United Kingdom
Dahl, Geir, Schlumberger, Tananger, Norway
Danielsen, Berit, Equinor, Stavanger, Norway
Evans, Michael, Halliburton, Trondheim, Trøndelag, Norway
Fei, Qiu, China University of Petroleum, Qingdao, Shandong, China
Fletcher, Chris, Qube Tech, Cleveland, TX, United States
Fornasier, Ivan, Schlumberger Limited, Enghien Les Bains, France
Fotland, Bjørn Harald, Petroware, Stavanger, Norway
Fundytus, Nicholas, Schlumberger, St. Albert, AB, Canada
Garrard, Rodney, Nagra, Richterswil, Switzerland
Gharib, Najib, Schlumberger, Paris, France
Groves, Duncan, Baker Hughes, Houston, TX, United States
Guo, Shen, Tianjin University, Tianjin, China
Gynnild, Frank, Prores AS, Melhus, Norway
Hanton, Christopher, Ikon Science, Houston, TX, United States
Harrison, Benjamin, Shell/Texas A&M University, Houston, TX, United States
Ingalls, Brian, BKV Corp, Littleton, CO, United States
Jimenez Sandrea, Erick, Silixa, Bushey, United Kingdom
Joshua, Pwavodi, University of Grenoble Alpes, Grenoble, Isère, France
Kolbjørnsen, Odd, Lundin Energy, Lysaker, Viken, Norway
Kovarskiy, Egor, Schlumberger, Bogota, Colombia
Kumar, Devendra, Schlumberger, Sandnes, Norway,
Laufer Barcellos, Henrique, Halliburton, Stavanger, Norway
LeCalvez, Joel, Schlumberger, Richmond, TX, United States
Linke, Maik, Baker Hughes, Celle, Lower Saxony, Germany
Lotsberg, Jon, Equinor, Bergen, Norway
Loviken, Pontus, Schlumberger, Montrouge, Ile-de-France, France
Ludvigsen, Hallgrim, SPAC AS, Stavanger, Norway
Masutti, Leonardo, Equinor, Guaruja, Brazil
Midgley, John, Deep Isolation, Huddersfield, United Kingdom
Miscia, Andrea, Geomark Research, Houston, TX, United States
Oldervoll, Alf, Reservoir Technical Services, Rådal, Norway
Øpsen, Daniel, ONE-Dyas Norge AS, Stavanger, Norway
Orlovs, Aleksandrs, Equinor ASA, Trondheim, Trøndelag, Norway
Peng, Nian, Southwest Petroleum University, Chengdu, Sichuan Province, China
Pinkstaff, Brad, Baker Hughes, Missouri City, TX, United States
Prymak-Moyle, Marta, Equinor, Trondheim, Trøndelag, Norway
Rahman, Shaela, Baker Hughes, Houston, TX, United States
Rowlands, Julie, Noesii, Machynlleth, Powys, United Kingdom
Sarkar, Subhadeep, Schlumberger, Sandnes, Rogaland, Norway
Schutjens, Peter, Shell, Rijswijk, Zuid-Holland, Netherlands
Shen, Jianguo, Tianjin University, Beijing, China
Tosi, Gianbattista, Vår Energi, Sandnes, Rogaland, Norway
Tu, Ning, Halliburton, Singapore
Willmon, Gregory, Baker Hughes, Bakersfield, CA, United States

Eric Prasse
1957–2022

It is with great sadness we announce that Eric Prasse passed away on August 6, 2022, at age 65. Eric was a vice president, senior staff petrophysicist, and geologist in DeGolyer and MacNaughton's Reservoir Studies Division in Dallas, Texas, before he retired in 2020. Those who knew Eric will remember him as a cheerful and unique gentleman with a passion for travel, bicycling, singing, and all things Disney. When not working, you could find him tailgating at a Dallas Cowboys or Mavericks game. He will be missed by his family, colleagues, friends, and church community.

Eric grew up in Silver Spring, Maryland, where he graduated high school at the age of 15. He moved to Houston, Texas, to attend Rice University, where he graduated with a BSc degree in geology in 1976. Eric then attended Texas A&M University and received an MSc degree in geology in 1978.

Upon attaining his master's degree, Eric joined Mobil Oil as a geologist. He worked for 15 years, holding a series of positions with increasing responsibilities in Dallas, New Orleans, The Netherlands, Germany, and Indonesia. Early in his career, Eric gained 50 weeks of wellsite geology experience. At the age of 28, he was the youngest American foreign resident in Mobil Oil. While living in The Netherlands, Eric developed a new career focus and transitioned from a geologist to a petrophysicist at Mobil. In 1991, he used petrophysical and geological analyses to predict pay properties in the Browse Basin of Australia. His analysis prompted a radical reassessment of reserves and exploration potential. Eric reinterpreted wireline-log data and used his knowledge of regionally variable formation-water resistivities to identify what would eventually become a 14 Tcf discovery. Prior interpretations considered this well as a dry hole. Years later, Eric's petrophysical prowess revealed 20 to 25 billion barrels of bypassed oil reserves to a surprised and happy Middle East client.

Eric joined DeGolyer and MacNaughton in 1998 as a senior petrophysicist, where he worked extensively on reservoirs in Algeria, Libya, Kuwait, and Russia. He used his technical expertise to complete integrated projects that included extensive normalization studies, parameter development from core data, petrofacies determination, detailed calculations, and thorough reporting. His results were used to construct geocellular models with a significant impact on client development plans. His technical work ensured the success of countless projects. Eric served as a team leader on-site with Russian clients and trained engineers and geologists worldwide in the art and science of petrophysics.

Eric spent 39 years working in the petroleum industry and contributed to the training and advancement of younger staff. Many have noted that he always gave his fellow coworkers credit for their accomplishments. He was a member of the Society of Petroleum Engineers and a member and former officer of the Society of Petrophysicists and Well Log Analysts and the American Association of Petroleum Geologists. Eric was a Professional Geologist in Texas and Louisiana and an AAPG Certified Petroleum Geologist.

Eric wished to make a difference in educating students in the field of geology and has set up the Eric Martin Prasse Chair endowment at Rice University. Eric is survived by his aunt Evelyn Fitzsimmons and cousin Evelyn Fitzsimmons Cuomo. Our thoughts and deepest sympathies go out to his family.

~Friends and Colleagues at DeGolyer and MacNaughton