





SPE Virtual Workshop: Integrated Water Injection Management

6-8 July 2021 | VIRTUAL [UTC+8]





Who Should Attend

Professionals involved in:

- Asset Operations and Management
- Data Science and Analytics
- Drilling and Completions
- EOR and IOR Specialisation
- Field Development Planning
- Geology and Geophysics
- Petrophysics and Geomechanics
- Production and Injection Chemistry

- Production Technology
- Projects, Facilities and Constructions
- Regulatory Activities
- Research and Development
- Reservoir Engineering
- Talent Management
- Water Injection Specialisation
- Wells Engineering

Water Injection (WI) to improve oil recovery is a process which has been utilised for more than a century and has significantly evolved over the years. A sizeable amount of conventional oil production can be attributed to WI. South East Asia (SEA) is a rich source of hydrocarbon resources—natural gas and petroleum from countries - Brunei, Vietnam, Indonesia and Malaysia. SEA is still left with sizeable oil reserve, despite a large historical production over a century, resulting in a large number of matured oil fields. Of these numerous matured fields, Malaysia alone has 28 WI fields targeting over 35% of discovered Stock-tank Oil Initially in Place (STOIIP), but accounting for 55% of total production with reservoir recoveries ranging from 20% to 60%. Hence in the South Eastern region as a whole, there is significant scope to improve recovery through production by WI optimisation and management. Additionally, there are several brownfields with the potential to increase recovery by adopting WI as an improved or secondary recovery mechanism.

WI has regained significance as the preferred IOR method in many cases., However, there are still technical and commercial challenges in WI fields, from conception to operations. These challenges are more pronounced due to low oil prices owing to the COVID-19 pandemic. Nevertheless, the industry needs to move forward with innovative WI ideas and solutions to continue being relevant, efficient, and cost-effective. The innovations should be holistic and cover the entire spectrum from subsurface to surface. The spectrum starts from the source, injector, reservoirs, surveillance, facilities, producers, to sales points. In addition, other factors are also involved; starting from exploration data acquisition to WI design and eventually to operate phase.

The key to effectively manage WI for recovery improvement is to understand the critical skill sets, and upgrade and embrace emerging trends in digitalisation, including machine learning and artificial intelligence. The "integrated digital approach" from automatic data gathering to smart remedial measures in WI fields is becoming an integral part of WI field management and is necessary to yield better overall performance.

Session Highlights

Keynote Address and Panel Session

WI Design in Field Development Strategies

Well Architecture and Well Completion Design

Effective Surveillance and Reservoir Management of Waterflooded Fields

Facilities, Operations Excellence and Lifecycle Management

Digitalising and Capability Development

Workshop Objectives

The aim of the workshop is to share the lessons learnt as well as new and innovative ideas to improve the effectiveness of WI projects, holistically encompassing all the components and phases of WI; from screening, designing, implementing and managing throughout the lifecycle of WI field. The workshop will facilitate harnessing of decades of experience for maximising recovery through WI in a cost-effective manner; where digital, technology and capability development will be among the enablers. The aim of the workshop is to share the



Bespoke, expert-led technical topics



Knowledge sharing and technical discussions



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Ali Didanloo Production Business Director. Eastern Hemisphere Schlumberger

MEMBERS

Jean-Christophe Noirot Cluster Development Lead, Champion field

Brunei Shell Petroleum

Aisha A'shikin Yaacob Team Lead Subsurface PM8E Activity Delivery **EnQuest**

Noman Shahreyar Senior Global Advisor - Completion Halliburton

Chander Shekhar Singh Principal (Reservoir Engineering)

PETRONAS

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Sekhar Sathyamoorthy Head Technical Advisory Group **PETRONAS Carigali Sdn Bhd**

Venkata Sai Subrahmanyam Garimella Specialist Reservoir Engineer - Custodian **PETRONAS Carigali Sdn Bhd**

Md Zarin Md Zainuri Head IOR/EOR **PETRONAS Carigali Sdn Bhd**

Goh Chun Kee Reservoir Engineering Manager **Repsol Oil and Gas Malaysia Limited**

Mohd Fadzil Harun Lead Reservoir Engineering Consultant (Asia) Schlumberger

Nicole Lashley Senior Reservoir Engineer **Woodside Energy Ltd**

WORKSHOP ADVISORS



Rahim Masoudi **Group Technical Authority** & Custodian Reservoir Engineering Resource Development & Management MPM, Upstream Business **PETRONAS** Chairman, SPE Asia Pacific

Regional Technical **Advisory Committee**



Andrew Parker Asset Development Lead **Brunei Shell Petroleum** Member, SPE Asia Pacific Regional Technical **Advisory Committee**



Raj Deo Tewari Chief Scientist **PETRONAS** Member, SPE Asia Pacific Regional Technical **Advisory Committee**



Note: All times are Greenwich Mean Time (UTC) +8

| TUESDAY, 6 JULY 2021 | | | | | |
|----------------------|---|--|--|--|--|
| 1300 - 1430 hours | Welcome Remarks, Keynote Address and Session 1: Panel Session – Future of WI: Advances and Challenges | | | | |
| 1430 - 1500 hours | Networking Break | | | | |
| 1500 - 1630 hours | 630 hours Session 2: WI Design in Field Development Strategies | | | | |
| 1630 - 1700 hours | 1630 - 1700 hours Networking Break | | | | |
| | WEDNESDAY, 7 JULY 2021 | | | | |
| 1300 - 1430 hours | Session 3: Well Architecture and Well Completion Design | | | | |
| 1430 - 1500 hours | 1500 hours Networking Break | | | | |
| 1500 - 1630 hours | 30 hours Session 4: Effective Surveillance and Reservoir Management of Waterflooded Fields | | | | |
| 1630 - 1700 hours | Networking Break | | | | |
| | THURSDAY, 8 JULY 2021 | | | | |
| 1300 - 1430 hours | Session 5: Facilities, Operations Excellence and Lifecycle Management | | | | |
| 1430 - 1500 hours | Networking Break | | | | |
| 1500 - 1630 hours | O - 1630 hours Session 6: Digitalising and Capability Development | | | | |
| 1630 - 1700 hours | Networking Break | | | | |

Register and join the sessions at your local time:

Doha / Kuwait City / Manama / Riyadh 0800 hours -

0900 hours -Abu Dhabi / Dubai / Muscat

1030 hours New Delhi 1130 hours Yangon

Bangkok / Hanoi / Jakarta 1200 hours -

1300 hours Bandar Seri Begawan / Beijing / Kuala Lumpur /

Perth / Singapore

1400 hours Tokyo / Seoul 1430 hours Adelaide 1500 hours Brisbane

1700 hours Wellington

(1) Technical Programme Preview

MONDAY, 26 APRIL 2021

1300 - 1345 hours

Welcome Remarks by Co-Chairs

Co-Chairs: Mohamad Zaini Md Noor, Head, Hydrocarbon Recovery Technology, **PETRONAS** Research Sdn Bhd; Ali Didanloo, Production Business Director, Eastern Hemisphere, Schlumberger

Keynote Address

1345 - 1430 hours

Session 1: Panel Session - Future of WI: Advances and Challenges

Session Managers: Jean-Christophe Noirot, Brunei **Shell Petroleum**; Sekhar Sathyamoorthy, **PETRONAS** Carigali Sdn Bhd;

The industry needs to adapt to the current environment with low-cost oil through many different initiatives and standards such as through fit for purpose, modular approaches and proactive management. This session will discuss about the future of WI, challenges involved and emerging solutions and novel applications.

1430 - 1500 hours

Networking Break

1500 - 1630 hours

Session 2: WI Design in Field Development **Strategies**

Session Managers: Venkata Sai Subrahmanyam Garimella, PETRONAS Carigali Sdn Bhd; Md Zarin Md Zainuri, **PETRONAS Carigali Sdn Bhd**

Planning development strategies for oil reservoirs is a very important stage in maximising oil recovery and reservoir management over the lifecycle of any field development. One of the effective reservoir management strategies is the process of injecting water into the aquifer/oil column to maintain the

reservoir energy/sweep and enhance the oil recovery. Voidage replacement ratio (VRR) was studied to obtain the best WI planning strategy to maximise oil production recovery and therefrom profitability. For all WI projects planning and designing constitutes an important element for maximise oil production recovery and therefrom profitability.

In order for the WI Design to be effective and efficient, appropriate sizing of the WI facilities and capacity, timely decision-making and placement of facilities are essential. Unfitting design may result in a big loss due to irreversible effects that occur in the reservoirs.

The objective of this session is to focus on the fundamental inputs required to assure the successful and timely implementation of a technically suitable WI project. The lessons learnt need to be captured and new approaches must be adopted to avoid repetitive mistakes.

Modularisation and standardisation options should be considered to derive the best value from WI. Deciding on the best injection strategy involves not only analysing the surface of WI capabilities but also subsurface aspects, such as geology rock properties and geomechanics. WI design should strike a balance between cost and operational effectiveness to meet water quality and reservoir management plan.

This session will cover topics related to improving methods, innovations of planning, and designing WI programmes based on lessons learnt and field applications.

1630 - 1700 hours Networking Break

🚫 Technical Programme Preview

WEDNESDAY, 7 JULY 2021

1300 - 1430 hours

Session 3: Well Architecture and Well Completion Design

Session Managers: Noman Shahreyar, Halliburton; Goh Chun Kee, Repsol Oil and Gas Malaysia Limited

Advancements in well architecture and completion design techniques continue to provide significant value to unlock new / complex reservoir targets and optimise field development and ultimately improve recovery factors.

Implementation of horizontal, multizone, and multilateral well architectures and advanced well completion techniques is growing globally and recognised as value adding well construction and completion methods to optimise WI performance and improve field recovery.

This session will discuss the key well type and completion that provide prudent reservoir management opportunities while optimising the WI operations in oil fields.

1430 - 1500 hours

Networking Break

1500 - 1630 hours

Session 4: Effective Surveillance and Reservoir **Management of Waterflooded Fields**

Session Managers: Jean-Christophe Noirot, Brunei Shell Petroleum; Nicole Lashley, Woodside Energy

Waterflooding is a demonstrated relatively low-cost approach to maintaining production and increasing oil recovery. In order to realise the full benefit of any waterflooding project, it is important not only to understand and implement time-tested concepts and practices but also to measure efficacy through utilisation of various surveillance techniques throughout asset life - from source water quality to produced water analysis, and everything in between as water circulates through facilities, wells and reservoirs.

The integrated role of geoscientists, petroleum engineers, field engineers, chemists and operators are critical in meeting project expectations.

This session will focus on how different operators and service providers utilise new and existing surface and subsurface surveillance technologies to gain insights into flood performance and make use of this information to optimise production and

1630 - 1700 hours Networking Break

THURSDAY, 8 JULY 2021

1300 - 1430 hours

Session 5: Facilities, Operations Excellence and Lifecycle Management

Session Managers: Aisha A'shikin Yaacob, EnQuest; Sumit Soni, PETRONAS

The infrastructure to improve oil production and recovery via waterflood by having a WI Facility on an existing platform or even greenfield are CAPEX Intensive. It is highly dependent on the design capacity, WI schemes, treatment procedures and planning, whereas the Operations Excellence and Lifecyle Management could extensively increase the Unit Production Costs (OPEX) of an operating asset. Therefore, it is very critical to manage lifecycle risks of any secondary or tertiary recovery investments compared to natural depletion before embarking on full project development.

This session will focus on how different operators and service providers manage early risks of investment, ageing facilities challenges in water treatment, water chemistry and flow assurance as well as by product and waste management in ensuring a holistic and robust WI management to increase the production and recovery of a field.

1430 - 1500 hours

Networking Break

1500 - 1630 hours

Session 6: Digitalising and Capability Development Session Managers: Chander Shekhar Singh, PETRONAS; Mohd Fadzil Harun, Schlumberger

The oil and gas industry has played a pivotal role in the economic transformation of the world, fuelling the need for heat, light and mobility of the world's population. Today, the industry has the opportunity to redefine its boundaries through digitalisation. After a period of falling crude prices and, frequent budget and schedule overruns, greater demands of climate change accountability and difficulties in attracting talent, the industry can provide practical solutions. Digitalisation can act as an enabler to tackle these challenges and provide value to all its stakeholders.

While digitalisation could be a source of positive change, there are several challenges that need to be overcome to realise its full potential. The increase in digitalisation aspects have created new risks around data privacy, security and other business challenges related to changing expectations, cultural transformation, outdated regulation and most importantly, skill shortages and capability development.

1630 - 1700 hours

Networking Break

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- a. Presentation slides / Proceedings will not be published; therefore, formal papers and handouts are not expected from Discussion Leaders.
- b. Work in progress, new ideas, and interesting projects are sought.
- c. Resource documents may be provided as pre-reads and during the live event.

2. Workshop Deliverables

- a. An on-demand version of the live event sessions will be made available to registered participants only.
- b. Provision of the live event sessions and presentation materials by Discussion Leaders willsignify their permission for SPE to do so.

3. Commercialism

In keeping with the Workshop objectives and the SPE mission, excessive commercialism in presentations are not permitted. Company logos must be limited to the title slide and used only to indicate the affiliation of the presenter.

4. Certificate of Attendance

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5. Continuing Education Units

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SPE VIRTUAL WORKSHOP: **Integrated Water Injection Management** 6 - 8 July 2021 | 13:00 (UTC +8)



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| Please state your | Technical Discipline (Select one | e ONLY): | | | _ | | |
| Completions | Data Science and E | Dri | lling | Health, Safety, Environment, and Sustainability | | | |
| Managemer | nt Production an | d Operations | Project | s, Facilities a | and Construction | | Reservoir |
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SPE VIRTUAL WORKSHOP: Integrated Water Injection Management 6 – 8 July 2021 | 13:00 (UTC +8)



| NO | ATTENDEE INFORMATION | | |
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| | Completions | Data Science and Engineering Analytics | Drilling Health, Safety, Environment, and Sustainability |
| | Management | Production and Operations | Projects, Facilities and Construction Reservoir |
| 6 | First Name (Forename) | | Last Name (Surname) |
| | Job Title | | Email Address |
| | SPE Member | Yes No | Membership Number |
| | | Discipline (Select one ONLY): | |
| | Completions | Data Science and Engineering Analytics | Drilling Health, Safety, Environment, and Sustainability |
| | Management | Production and Operations | Projects, Facilities and Construction Reservoir |
| 7 | First Name (Forename) | | Last Name (Surname) |
| | Job Title | | Email Address |
| | SPE Member | Yes No | Membership Number |
| | | Discipline (Select one ONLY): | |
| | Completions | Data Science and Engineering Analytics | Drilling Health, Safety, Environment, and Sustainability |
| | Management | Production and Operations | Projects, Facilities and Construction Reservoir |
| 8 | First Name (Forename) | | Last Name (Surname) |
| | Job Title | | Email Address |
| | SPE Member | Yes No | Membership Number |
| | | Discipline (Select one ONLY): | Delling Unable Cofee, Environment and Contribution |
| | Completions | Data Science and Engineering Analytics | Drilling Health, Safety, Environment, and Sustainability |
| | Management | Production and Operations | Projects, Facilities and Construction Reservoir |
| 9 | First Name (Forename) | | Last Name (Surname) |
| | Job Title | | Email Address |
| | SPE Member | Yes No | Membership Number |
| | | Discipline (Select one ONLY): | |
| | Completions | Data Science and Engineering Analytics | Drilling Health, Safety, Environment, and Sustainability |
| | Management | Production and Operations | Projects, Facilities and Construction Reservoir |
| 10 | First Name (Forename) | | Last Name (Surname) |
| | Job Title | | Email Address |
| | SPE Member | Yes No | Membership Number |
| | | Discipline (Select one ONLY): | |
| | Completions | Data Science and Engineering Analytics | Drilling Health, Safety, Environment, and Sustainability |
| | Management | Production and Operations | Projects, Facilities and Construction Reservoir |



SPE VIRTUAL WORKSHOP: Integrated Water Injection Management 6 – 8 July 2021 | 13:00 (UTC +8)



REGISTRATION TERMS & CONDITIONS

Registration Fee

- a. Registration for this virtual workshop is personal to Participant. Viewing and materials may not be shared with non-registered individuals without express consent from SPF
- b. Each participant is limited to maximum of two (2) devices to access/login into the virtual workshop.
- Registration is non-transferable without written notification to SPE.
- d. Registration of participation will only be confirmed upon receipt of full payment or an acceptable employer's letter of guarantee.
- e. SPE reserves the right to cancel the registration if no payment is received prior to or on the date of the virtual workshop.
- f. Full fee is charged regardless of the length of time the Participant attends the virtual workshop and cannot be pro-rated.

2. Taxe

Fees are made free and clear of, and without any deduction or withholding for and on account of, any taxes, duties or other deductions. Any such deduction or withholding, if required by the laws of any country are the sole responsibility of the participant.

3. Cancellation Policy

- a. A processing fee of USD 50.00 per person will be charged for cancellation received before 1 July 2021.
- b. No refund for cancellation received after 1 July 2021.
- c. Participants who failed to attend will not be eligible for a refund.
- d. Cancellation must be notified in writing to SPE. Email your cancellation request to apweb@spe.org.

4. Copyright

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5. Privacy Policy

- a. SPE cares about the protection of participants' personal information. SPE complies with applicable privacy laws, including GDPR, in collecting and processing your data. Participants have control over how much of their personal data is shown to other users for networking purposes. Participants can manage the data in their personal profile within the virtual event platform. The virtual event platform provider processes the data attributed to this event on behalf of SPE. SPE collects and processes data for the purposes of fulfilling your registration order, analysing how this platform performs and is used, and marketing for future related SPE events. All participants maintain the right of erasure and can withdraw their consent at any time. Please see SPE's <u>privacy policy</u> for additional information.
- b. By engaging with sponsor and exhibitor booths or content, participants are consenting to exhibiting and sponsoring companies having access to the personal data that is public in their personal profile. Participants will need to contact the exhibiting and sponsoring companies regarding their privacy policies and to request erasure.
- c. Through the virtual event platform, participants may request to connect, which the receiving participant has the option to accept or decline. The platform's networking technology also recommends to participants related content and participants who match their interests.
- d. For any queries or concerns please contact the events team at apweb@spe.org.

7. Disclaimer

- a. SPE reserves the right to change the speaker(s), date(s) and/or to cancel the virtual workshop should circumstance beyond its control arises.
- b. SPE will not be liable to participants for any damages, costs, losses or expenses of any kind incurred or suffered by participants as a result of or in relation to SPE modifying, postponing or cancelling the virtual workshop or any part of the virtual workshop.

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SPE Contact: Society of Petroleum Engineers

Email: apweb@spe.org