Practical Aspects of CO2-EOR Project Development

Optimize Your CO2-EOR Project Development by Learning The Best Practical Things

Date: 18th August - 22nd August 2014
Location: Kuala Lumpur, Malaysia

Petrosync Distinguished Lecturer
Dr. Ashok K. Singhal
- Principal Consultant of Premier Reservoir Engineering Services Ltd.
- Distinguished Service Award of the Petroleum Society of CIM, Calgary Section for 1993
- Petroleum Society of CIM's Outstanding Service Award for 1995
- SPE Canadian Section's 10th Anniversary Outstanding Contribution Award, 1999

Course Objectives
- Overview of various steps involved in CO2-EOR project development
- In-depth discussion of screening of prospects for different CO2-EOR processes
- Field tests and laboratory investigations as aids in developing a CO2-EOR project
- Field piloting of proposed CO2-EOR schemes and interpretations
- Monitoring and surveillance
- Overall scrutiny of CO2-EOR schemes

IN-HOUSE SOLUTIONS
SAVE COST • IMPROVE PERFORMANCE • REDUCE RISK
PetroSync understands that in current economic climate, getting an excellent return on your training investment is critical for all our clients. This excellent training can be conducted exclusively for your organization. The training can be tailored to meet your specific needs at your preferred location and time. We will meet you anywhere around the globe.

If you like to know more about this excellent program, please contact Jerry Tay (Conference Director) on +65 6415 4502 or email jerry.t@petrosync.com
Course Overview

CO2-Enhanced oil recovery (EOR) projects involve significant risks due to additional capital and operating costs for purchasing and recycling CO2, new wells, equipment, and fluid handling/treatment to mitigate corrosion/hydrate issues. It follows that they be optimally screened, designed and operated to reduce the overall risks.

This five-day course discusses various steps involved in development of an EOR project. These steps include screening, laboratory and field testing, simulation, design, interpretation and follow-up of CO2-EOR field pilots including appropriate monitoring/surveillance, installation of CO2 recycling (separation, dehydration & compression) facilities and critical reviews of unresolved issues in the proposed projects. The course will include case studies, exercises and a workshop involving active class participation in order to reinforce various concepts.

This course is designed for

- Reservoir Engineer
- EOR Engineer
- Production Engineer
- Petroleum Engineer
- Geologist
- Project Engineers
- Project Managers

Petrosync Distinguished Lecturer

Dr. Ashok K. Singhal

- Principal Consultant of Premier Reservoir Engineering Services Ltd.
- Distinguished Service Award of the Petroleum Society of CIM, Calgary Section for 1993
- Petroleum Society of CIM’s Outstanding Service Award for 1995
- SPE Canadian Section’s 10th Anniversary Outstanding Contribution Award, 1999

Ashok Singhal is a Principal Consultant at Premier Reservoir Engineering Services Ltd, a consulting firm that specializes in assisting in the screening and development of optimal technology strategies to exploit hydrocarbon resources including: oil sands, heavy oil, conventional and tight oil. Ashok works with a network of consultants to deliver client services.

Ashok has over thirty years of experience as a supervisor, engineer, consultant and research scientist in the oil industry and research organizations, where he worked on EOR screening, project development, implementation and evaluation of various recovery schemes to exploit existing oil and gas resources, or to assure that tight oil resources would become commercially viable in the medium to long terms. Ashok has published or presented more than 60 technical paper/major reports. Ashok has participated in screening, conceptualizing, feasibility evaluation, planning, implementation, or evaluation of several Improved or Enhanced Oil Recovery (IOR/ EOR) pilots in the field. These include:

- Immiscible gas flooding projects in all over the world
- Hydrocarbon miscible flooding (tertiary), CO2 flooding (post-tertiary) and also, Chemical Floods
- Cyclic Steam Stimulation and in situ combustion
- Feasibility/design studies of several water, gas & steam floods, steam assisted gravity drainage (SAGD), and enhanced gas recovery (EGR).
Course Agenda

DAY 1: CO2 EOR Overview

- Class Introduction/ Course Expectations
- Course Outline
- Reservoir Mechanisms behind Incomplete Oil Drainage;
- Different Kinds of CO2 Injection Schemes Phase Behaviour, Miscibility, Oil-Reservoir Rock Interactions
- Displacement and Sweep Efficiencies
- Some Case studies
- Conceptualizing CO2 Assisted Enhanced Oil Recovery Schemes
- Reservoir Characterization for CO2-EOR

DAY 2: Screening of Reservoir for CO2-EOR

- Laboratory Testing and Implication of Results
- Philosophy behind EOR Screening
- Screening for Gas Injection based EOR schemes
- Practical Considerations and Economics
- Class Problem-1 (Screening for Gas Injection Assisted EOR)
- Screening for Miscible and Immiscible CO2-EOR
- Practical Considerations and Economics
- Class Problem-2 (Screening for CO2-EOR)
- Case Studies of Horizontal Miscible CO2-Floods
- Case Studies of Vertical CO2-Floods
- Case Studies of CO2 Huff ‘n Puff
- Field Testing and implication of Results

DAY 3: Field Piloting for CO2-EOR Schemes

- Why Pilot? Kinds of EOR Pilots
- Setting Objectives
- Conceptualizing the Pilot
- Pilot Site Selection
- Injectivity and pressure testing
- Pre-Pilot Preparatory Work
- Identifying Success Indicators and Interpretation Strategy
- Critical requirements for Pilot Operations
- Specifying requirements for Facilities
- Monitoring and Surveillance Plans
- Operating Guidelines/ Project Implementation
- Tracking Progress of the Pilot/ Scaling up Pilot Results to a Larger Area

PROGRAM SCHEDULE

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 – 09:00</td>
<td>Registration (Day1)</td>
</tr>
<tr>
<td>09:00 – 11:00</td>
<td>Session I</td>
</tr>
<tr>
<td>11:00 – 11:15</td>
<td>Refreshment &amp; Networking Session I</td>
</tr>
<tr>
<td>11:15 – 13:00</td>
<td>Session II</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>14:00 – 15:30</td>
<td>Session III</td>
</tr>
<tr>
<td>15:30 – 15:45</td>
<td>Refreshment &amp; Networking Session II</td>
</tr>
<tr>
<td>15:45 – 17:00</td>
<td>Session IV</td>
</tr>
<tr>
<td>17:00</td>
<td>End of Day</td>
</tr>
</tbody>
</table>
WHY YOU SHOULD ATTEND PETROSYNC’S EVENTS

- To ensure that all objectives of the course matches yours, all PetroSync programs are developed after intensive and extensive research within the industry
- PetroSync programs focus on your immediate working issues to ensure that you are able to apply and deliver immediate results in real work situations
- Application and implementation of industry knowledge and experience are the drivers for our course design, not theoretical academic lectures
- PetroSync training focuses on practical interactive learning tools and techniques including case studies, group discussions, scenarios, simulations, practical exercises and knowledge assessments during the course. Invest a small amount of your time to prepare before attending the course to ensure maximum learning
- PetroSync follows a rigorous selection process to ensure that all expert trainers have first-hand, up-to-date and practical knowledge and are leaders of their respective industrial discipline

Course Agenda

DAY 4 - Reservoir Surveillance and Monitoring

- Overview
- Methodology of Surveillance
- CO2-EOR Project Monitoring: Critical Aspects
- Water Flood Surveillance Practices
- CO2-EOR Project Surveillance
- Monitoring of Injectivity/ Productivity and Pressure
- Monitoring of Volumetric Sweep
- Monitoring of Corrosion and Scales
- Other Available Monitoring Tools and Methods
- Development of a Surveillance Plan
- Interpreting Viability of CO2-EOR from Monitored Data
- Identification of Outstanding Challenges during Commercial Phase
- Risk Mitigation Plans; Need for a Demonstration Pilot Phase?
- Exercises and Case Studies

DAY 5 - Workshop

- Performance Predictions by Simulation and Analogy
- Designing and Planning Aspects
- Sub-Surface Facilities and Operational Considerations
- CO2-EOR Cases/Issues Raised by the Class
- Main Challenges and Key Unknowns/Uncertainties
- Feasible options
- Pros and Cons of each Option: Practical and Economic aspects
- Preferred Option and Follow Up
- General Discussion of CO2-EOR Implementation and Managing Performance
- Concluding Remarks
### INVESTMENT PACKAGES

Please circle the package that you are attending!

<table>
<thead>
<tr>
<th>Investment Package</th>
<th>Deadline</th>
<th>5 DAYS MASTERCLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Price</td>
<td>15th Aug 2014</td>
<td>SGD $ 5,995</td>
</tr>
<tr>
<td>Early Bird Offer</td>
<td>18th Jul 2014</td>
<td>SGD $ 5,795</td>
</tr>
<tr>
<td>Group Discount (3 or more Delegates)</td>
<td>15th Aug 2014</td>
<td>10% discount for groups of 3 registering from the same organization at the same time</td>
</tr>
</tbody>
</table>

* To enjoy the promotion & discount offer, payment must be made before deadline
* For 5 or more delegates, please inquire for more attractive package.
* Prices include lunches, refreshments and materials. Promotion & discount cannot be combined with other promotional offers.
* Important: Please note that registration without payment will incur a SGD 200 administration fee.

### PAYMENT METHODS

- By Credit Card: Please quote invoice number(s) on remittance advice.
- By Direct Transfer: Please quote invoice number(s) on remittance advice.

PetroSync LLP Bank details:
- Account Name: PetroSync LLP
- Bank Number: 7144 • Branch Code: 001 • Account No: 010-2255-105
- Name of Correspondent Bank: Standard Chartered Bank, 6 Battery Road, Singapore 049909
- SWIFT Code of Correspondent Bank: SCBLSGSGXXX

All bank charges to be borne by payer. Please ensure that PetroSync LLP receives the full invoiced amount.

### TERMS AND CONDITIONS

#### DISCLAIMER

Please note that trainers and topics were confirmed at the time of publishing; however, PetroSync may necessitate substitutions, alterations or cancellations of the trainers or topics. As such, PetroSync reserves the right to change or cancel any part of its published programme due to unforeseen circumstances. Any substitutions or alterations will be updated on our webpage as soon as possible.

#### DATA PROTECTION

The information you provide will be safeguarded by PetroSync that may be used to keep you informed of relevant products and services. As an international group we may transfer your data on a global basis for the purpose indicated above. If you do not want us to share your information with other reputable companies, please tick this box.

#### CANCELLATION POLICY

You may substitute delegates at any time as long as reasonable advance notice is given to PetroSync. For any cancellation received in writing not less than fourteen (14) working days prior to the training course, you will receive a credit voucher less a SGD $200 administration fee and any related bank or credit card charges.

Delegates who cancel less than fourteen (14) working days of the training course, or who do not attend the course, are liable to pay the full course fee and no refunds will be granted.

In the event that PetroSync cancels or postpones an event for any reason and that the delegate is unable or unwilling to attend on the rescheduled date, you will receive a credit voucher for 100% of the contract fee paid. You may use this credit voucher for another PetroSync event at a later date.

PetroSync is not responsible for any loss or damage as a result of the cancellation policy. PetroSync will assume no liability whatsoever in the event this event is cancelled, rescheduled or postponed due to any Act of God, fire, act of government or state, war, civil commotion, insurrection, embargo, industrial action, or any other reason beyond management control.

#### CERTIFICATE OF ATTENDANCE

A minimum of 70% attendance is required prior issuance of PetroSync’s Certificate.

#### DECLARATION

I agree to PetroSync’s terms & conditions, payment terms and cancellation policy.

Authorized Signature: ____________________________

### PAYMENT TERMS

- Payment is due in full at the time of registration. Full payment is mandatory for event attendance.