APPLYING FLUID INCLUSION TECHNIQUES TO PETROLEUM E&P

Manage E&P risk through application of Fluid Inclusion Stratigraphy to high-grade present and future prospects

7TH - 9TH of SEPTEMBER 2015 at KUALA LUMPUR, MALAYSIA

Petrosync Distinguished Instructors

Dr. Donald Lewis Hall - Main Presenter via Online Webex
President, Fluid Inclusion Technologies Inc.

- Co-Founder & President of Fluid Inclusion Technologies Inc, the leading service provider for laboratory analysis of fluid inclusions. He currently develops and promote research and rock/fluid-based analytical programs to address hydrocarbon exploration and production problems
- Over 30 years of experience with international oil and gas industry and the research field mostly with Amoco Production Research as Research Scientist, and has notable expertise in developing and implementing novel fluid inclusion instrumentation and techniques in petroleum E&P

Dr. JC Chao - On-Site Lecturer
Petroleum Geochemist, Fluid Inclusion Technologies Inc.

- Dr. JC Chao is FIT's geochemist with extensive experience in research and business aspects of oil and gas production issues (conventional & unconventional such as shale gas, shale liquids, and coal bed methane)

Mr. Barry Ringer - On-Site Facilitator
Consultant, Fluid Inclusion Technologies Inc.

- Currently handles FIT's business development support for its international O&G clients. Over 46 years professional experience in the petroleum service and consultancy business working for leading companies in their respective fields in various parts of the world, previously with Shell, and including 25 years with Robertson Research (now CGG Robertson)

COURSE OBJECTIVES

- LEARN the key technical drivers for applying fluid inclusion techniques - including attributes, advantages, and limitations when used for exploration and development
- UNDERSTAND fluid inclusion, petrography, microthermometry, & chemistry (including API gravity), and its application to basin models, timing of charge and cementation, and detecting migration and paleo-accumulations
- ANALYZE organic and inorganic fluid species within fluid inclusions trapped in cuttings, core or outcrop samples
- APPLY fluid inclusion techniques to analysis of petroleum and diagentic processes operations from basin to reservoir scale
- UTILIZE interpretive principles learned during the course to understand a typical FIS report and its supporting data
- INTERPRET and ANALYZE fluid inclusion for gases and liquids and for application to regional studies of conventional and unconventional data

Supported by: Petrofinder, Data Insights, HEDGE CONNECTION, Worldoils, EnergyChinatrade.com, Petrofinder, China Oil - China Gas.
Fluid inclusion techniques are flexible tools applicable to fundamental E&P problems. It can help increase the understanding of the petroleum system and help manage E&P risk by assessing the present and past distribution of petroleum, its sources and its characteristics. Fluid inclusion stratigraphy can help high-grade present and future prospects.

This three-day course consist of lecture material that covers the application of fluid inclusion stratigraphy, which provides the means of analyzing organic and inorganic fluid species within fluid inclusions trapped in cuttings, core, or outcrop samples. The program shall discuss how fluid inclusion techniques can provide a unique view of petroleum and diagenetic processes operating from basin to reservoir scale.

The program covers the technical drivers of fluid inclusion techniques - its various types, constraints, attributes, and the advantages & limitations during application. Fluid Inclusion petrography, microthermometry, and chemistry will also be covered. This will discuss its application to estimation of basin maturity, relation to fluid source, API gravity determination, and linkage of microthermometric data to basin models. Fluid Inclusion Stratigraphy will also be presented, following with detailed analysis and interpretation of FIS Data. Analysis of fluid inclusion gases and liquids via CSIA and GCMS methods will also be presented. Lastly, various conventional and unconventional data and interpretation from regional studies will be covered in the program as examples of FIS application.

COURSE OVERVIEW

Fluid inclusion techniques are flexible tools applicable to fundamental E&P problems. It can help increase the understanding of the petroleum system and help manage E&P risk by assessing the present and past distribution of petroleum, its sources and its characteristics. Fluid inclusion stratigraphy can help high-grade present and future prospects.

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COURSE OUTLINE

I. INTRODUCTION TO FLUID INCLUSIONS

- Fluid Inclusion Definition
- Primary, Secondary, Pseudosecondary
- Types of Inclusions: Gas, Liquid, Solid
- Fluid Inclusion Formation and Preservation
- Constraints on Formation, Low Temperature Processes, Lithologic Controls
- Homogeneous and Heterogeneous Entrapment
- Preservation, Post-Entrapment Modifications
- Inclusion Attributes, Advantages, & Limitations
- Information Obtainable
II. FLUID INCLUSION PETROGRAPHY, MICROtherMOMETRY AND CHEMISTRY

- Fluid Inclusion Petrography Goals, Techniques and data
- Accuracy and Precision vs. Natural Variation
- Inclusion Abundance vs. Hydrocarbon Saturation
- Fluid Inclusion Microthermometry Defined
- Homogenization Temperature
- P-T-X Diagrams of Typical Subsurface Fluids
- Isochores and Crossing Isochore Techniques
- Homogenization Temperature vs. Trapping Temperature
- Saturation State from Paired Oil and Brine Analyses; Evidence for Coexisting Oil and Gas
- Estimating Maturity - Maximum Burial Temperature
- Salinity determinations (Te, Tm) - Relation to Fluid Source
- Salinity of Irreducible Water for Sw Calculations
- API Gravity Determinations: Qualitative and via Quantitative Fluorescence and Cryo-optical Means
- Linking Microthermometric Data to Basin Models
- EXERCISES

III. FLUID INCLUSION STRATIGRAPHY (FIS; AKA FLUID INCLUSION VOLATILE ANALYSIS; FIV)

- Definition and Introduction
- Applications (Conventional and Unconventional Reservoirs)
- GC, vs. MS, vs. GCMS. FIS is a Direct Quadrupole Mass Spectrometry (DQMS) Technique
- FIS Data: Depth Plots and Spectra
- Understanding DQMS Spectra: Fragmentation Patterns, Common Mass Overlap
- Organization of a Typical FIS Report
- Interpreting FIS Data
  - What is Anomalous
  - Hydrocarbon Type (Spectral Characterization)
  - Sulfur Species Anomalies; Biodegradation and Thermal Alteration
  - FIS Microseeps
  - Water-Soluble (BTEX and Organic Acid) Anomalies (Proximity to Pay concept)
  - Seals
  - Inorganic Gases
  - Source Rocks
  - Contamination (OBM, Mud Additives, Bit Metamorphism)
  - Integration with other Data
- FIS Case Studies
- EXERCISES

IV. EXTRACTION AND ANALYSIS OF FI GASES AND LIQUIDS VIA CSIA AND GC/GCMS

- Suitability of Samples - Importance of Pre-screening via FIS
- Liquids analysis via GCMS - Methods and Application Examples
- Gases analysis via CSIA - Methods and Application Examples

V. SELECTED DATA AND INTERPRETATIONS FROM REGIONAL STUDIES

- Conventional
- Unconventional

VI. OPEN DISCUSSION & CLOSING SESSION
Don is a seasoned professional with over 30 years of experience in the research field and oil and gas industry. He is currently the President of Fluid Inclusion Technologies Inc (FIT), which is a petroleum industry service company that specializes in laboratory analysis of trapped fluids in rock material, and advanced borehole gas analysis on drilling wells. The ultimate goal of these services is to enable clients to address petroleum systems and reservoir characterization problems.

Don has been responsible for helping define and implement the technical direction of FIT, and continues to be involved in the development and application of novel geochemical and petrologic technologies for the energy industry. In FIT, he continues to develop and promote focused research and rock/fluid-based analytical programs to help address hydrocarbon exploration and production problems.

Don's major research focuses on application of organic and inorganic geochemical data to petroleum exploration and exploitation problems and diagenetic studies. Of particular interest are techniques involving the use of fluid inclusions to aid in understanding petroleum systems. His other research centers on improving wellsite analysis of pore fluids and use of hydrothermal experimental techniques to constrain basin and reservoir processes. His teaching interests include general topics in petroleum geology, fluids in crustal processes, diagenesis, organic geochemistry, hydrothermal experimental techniques, fluid inclusion research, ore deposits/resources geology, reflected and transmitted light microscopy and metamorphic petrology.

Don received B.S. (1982) and M.S. (1985) degrees in geology from the University of California at Riverside, and a Ph.D. (1989) in geology from Virginia Tech. Before FIT, he was with Amoco Production Research in 1990 as a research scientist and worked on development and implementation of novel fluid inclusion instrumentation and techniques.

Awards and Recognitions

- SEPM Excellence of Poster Presentation Award (1995)
- Oak Ridge National Laboratory Research Grant (1988-1989)
- Cunningham Fellowship, Virginia Polytechnic Institute & State University (1988-1989)
- Academic Achievement Award, Virginia Polytechnic Institute and State University (1986-1987)
- Finnigan Scholarship, Mineralogical Society of America (1986)
- Roland Blanchard Fellowship, University of California, Riverside (1983-1984)

Selected Publications


PetroSync Distinguished Instructor (Onsite Presenter)

DR. JC Chao  
Petroleum Geochemist  
Fluid Inclusion Technologies inc

Dr. JC Chao is FIT’s geochemist with extensive experience in research and business aspects of oil and gas production issues (conventional & unconventional such as shale gas, shale liquids, and coal bed methane). Dr. Chao has been with FIT, handling integration of fluid inclusion technology with traditional geochemistry to have a better understanding on petroleum system, hydrocarbon migration, and prospect evaluation. He has also performed source rock to oil, source rock to gas correlation with hydrocarbon biomarker fingerprinting, gas isotope interpretation, and integrate into basin, prospect, field or well analysis.

Dr. Chao has conducted petroleum system studies in exploration/development & production of conventional and unconventional resources (and have worked on domestic and oversea projects such as Rockies, mid-continent, GOM, Libya, Egypt, North Sea, South America, Caspian, UAE, Se Asia etc). Dr. Chao is adept in application of reservoir geochemistry techniques (TOC/REval, VRo, GC, GC HPLC, GCMS, FTIR, etc) to assess hydrocarbon quality, and interpreting the present day maturity, maturation history of probable source rocks and migration pathways of hydrocarbons.

PetroSync Distinguished Instructor (Onsite Facilitator)

Mr. Barry Ringer  
Consultant  
Fluid Inclusion Technologies inc

Mr. Barry Ringer has over 46 years professional experience in the petroleum service and consultancy business working for leading companies in their respective fields in various parts of the world, including 8 years based in North America, 11 years in the Far East (Japan & S.E Asia,) and 6 years in the Middle East. After 5 years working in the field, including 2 years as a wellsite geologist for Shell in Japan, he has held a variety of regional and head office general, operations and marketing management positions. From 1987 until 2012, Barry was employed by Robertson Research (now CGG Robertson), and in spring 2013 he joined a UK based geoscience focused consultancy group.

Mr. Ringer is currently handling the business development support for international clients of FIT. He brings to the company decades of his experience in the Oil and Gas industry, including both technical and commercial aspects.

PROGRAM SCHEDULE

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>08:00 – 09:00</td>
<td>Registration (Day1)</td>
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<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>
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<tr>
<td>11:15 – 13:00</td>
<td>Session II</td>
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<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00 – 15:30</td>
<td>Session III</td>
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<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>
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**COURSE DETAILS**

Title: APPLYING FLUID INCLUSION TECHNIQUES TO PETROLEUM E&P  
Date: 07th - 09th September 2015  
Location: Kuala Lumpur, Malaysia

**INVESTMENT PACKAGES**

<table>
<thead>
<tr>
<th>Investment Package</th>
<th>Deadline</th>
<th>Price</th>
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<tbody>
<tr>
<td>Standard Price</td>
<td>04 SEPT 2015</td>
<td>USD $2695</td>
</tr>
<tr>
<td>Early Bird Offer</td>
<td>07 AUG 2015</td>
<td>USD $2495</td>
</tr>
<tr>
<td>Group Discount (3 or more Delegates)</td>
<td>04 SEPT 2015</td>
<td>10% discount for groups of 3 registering from the same organization at the same time</td>
</tr>
</tbody>
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- *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.

**DELEGATES DETAILS**

1st Delegate Name ____________________________  
Direct Line Number: ____________________________  
Job Title: ____________________________  
Email: ____________________________  
Head of Department: ____________________________

2nd Delegate Name ____________________________  
Direct Line Number: ____________________________  
Job Title: ____________________________  
Email: ____________________________  
Head of Department: ____________________________

3rd Delegate Name ____________________________  
Direct Line Number: ____________________________  
Job Title: ____________________________  
Email: ____________________________  
Head of Department: ____________________________

**INVOICE DETAILS**

Attention Invoice to: ____________________________  
Direct Line Number: ____________________________  
Fax: ____________________________  
Email: ____________________________  
Company: ____________________________  
Address: ____________________________  
Postcode: ____________________________  
Country: ____________________________  
Email: ____________________________  

Please note:
- Indicate if you have already registered by Phone  
- Fax  
- Email  
- Web  
- If you have not received an acknowledgement before the training, please call us to confirm your booking.

**PAYMENT METHODS**

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

**PAYMENT TERMS**

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

**CERTIFICATE OF ATTENDANCE**

70% attendance is required for PetroSync’s Certificate of Attendance.

**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.

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**TERMS AND CONDITIONS**

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 web page as soon as possible.

**CHARGES & FEE(s)**

- For Payment by Direct Telegraphic Transfer, client has to bear both local and overseas bank charges.

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