Formation Pressure Prediction & Evaluation

Master formation pressure evaluation to facilitate effective well design & reduce drilling risks, NPT, and associated costs

17th AUGUST 2015 - 21st AUGUST 2015 at BALI, INDONESIA

PetroSync Distinguished Instructor:
TIM HERRETT
Founder & Principal Consultant, Tim Herrett Ltd

- Over 35 years of experience in the Oil & Gas industry both in Operations Geology & Wellsite Operations
- He is a recognized expert in formation pressure evaluation in BP, ExxonMobil, and BG
- His major clients include Exxon Mobil and BP in Norway, Brazil, Turkey, and Egypt (since 2001)
- Worked on High Pressure & High Temperature wells for ExxonMobil & BP (since 2000)
- Authored Operations and Wellsite Geology procedure manuals for ExxonMobil Exploration, Development, and Production Companies in Norway and Houston

Course Objectives
- Understand the different formation pressures - pore, fracture, and overburden pressure
- Relate the significance of earth stresses and relationship to formation pressure issues
- Calculate pressure gradients and apply to casing placements, formation pressure plotting, and equivalent mud weight plotting
- Determine how hydrocarbon generation and migration is influenced by formation pressure
- Master the evaluation and calculation of subsurface pressures through both quantitative and qualitative methods
- Learn how formation pressure are calculated using log and seismic data and industry standard algorithms
- Identify the critical data requirements for pore pressure prediction and evaluation
- Understand hazardous events of influxes and kicks during drilling operations
- Integrate subsurface data & drilling events, control data quality, identify non-pore pressure related hole problems, and understand the behavior of data before making any prediction analysis

Specially Designed for

- Wellsite Geologists
- Drilling Engineers
- Operations Geologists
- LWD Engineers
- Well Planning Geologists
- Mud Loggers

Prerequisite: This course will assume that participants have at least a basic knowledge of wellsite geology practices and rig activities
This course will provide a better understanding of pressure characteristics found in the subsurface. Delegates will be able to define the fundamentals of pore pressure, fracture pressure, and overburden pressure as well as earth stresses. This course will also cover the mechanism of how abnormal formation pressure is developed and its important relationship to the evaluation of hydrocarbon generation and migration. This course will focus on providing the methodologies and techniques available in evaluating formation pressure both qualitatively and quantitatively. Topics will include methods of pre-well prediction using seismic and basin modelling as well as evaluation using trend analysis techniques and pore pressure indicators. This will be supported with case studies and exercises throughout the sessions. Delegates will learn how to use an integrated approach to evaluation using subsurface data and drilling events to fully understand formation pressures.

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. This 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 program, please contact +65 6415 4500 or email general@petrosync.com
Day Two: Pore Pressure Generation Mechanisms and Control on Distribution

Syndepositional/Compaction Related - Primary Mechanisms
- Undercompaction/Compaction Disequilibrium
- Syntectonic
- Chemical and Diagnostic Changes
- Osmosis/Ionic Filtration

Post Depositional/Non Compaction Related - Secondary Mechanisms
- Pressure Charging and Transfer
- Centroid Effect
- Aquathermal
- Structural/Tectonic
- Role of Faulting
- Hydrocarbon Generation and Cracking
- Salt and Shale Diapirs
- Hydrocarbon Buoyancy

Exercises: Calculation of Fluid Densities, Hydrocarbon Densities, Buoyancy from MDT data

Day Three: Formation Pressure Evaluation (Part 1)

Wellsite Formation Pressure Evaluation
- Introduction and Overview
- Fundamental Aspects

Quantitative Analysis Method
- Ratio Method
- Equivalent Depth or Matrix Stress Method
- Eaton Method
- Common Problems
- What method should be used?

Curve Trend Analysis
- Sonic Log or ITT
- Resistivity/Conductivity
- Density

Exercise: Calculation of Pore Pressure from Sonic Log

Pre-Well Pressure Prediction Methods
- Seismic Methods
- Basin Modeling Methods
- Use of Offset Well Data
- Error Bar Management

Impact of Mechanism on Prediction and Evaluation:
Seals, Cells, and Compartments
- Introduction
- Seals
- Cells and Compartments
- Seal Breach

Hydrodynamics
- Overview
- Buhrig’s Model
- Potentiometric Surfaces and Tilted Contacts

Exercises: Application of Potentiometric Surfaces

Wireline and Logging While Drilling (LWD)
- Using Log Data
- Trend Line Set-Up

Direct Pressure Measurements
- Influxes and Kicks

Case Study: Analysis of Kicks Indications
Exercise: Evaluation of Problematic MDT Data
- Wireline and LWD Pressure

Exercise: Evaluation of Problematic MDT Data
- Drill Stem Tests

Fracture Pressure Measurements
- LOTS and FITs
- LOT Plots and diagnosis
- Mud Losses / Lost Circulation
- Background
- Stresses
- Wellbore Strengthening

Case Study: LOT Plot Types
Day Four: Formation Pressure Evaluation (Part 2)

**Indirect Pressure Indicators:**
- Drilling Indicators
  - Drilling Rate and Drilling Exponents
  - Using Drill Rate in While-Drilling
  - Evaluation Drilling Exponents Using The DXC
- Shale Characteristics
  - Shale Density
  - Shale Factor
  - Shale Resistivity
- Hole Conditions
  - Terms for Hole Conditions
  - Typical Hold Conditions with Increasing Pressure

**Trip Condition Log**

**Non-Pore Pressure Related Hole Problems:**
- Cuttings and Cavings
  - Cutting Size and Appearance
  - Pressure Cavings
  - Other Types of Cavings
  - Monitor Cuttings and Cavings Sizes

**Gas Relationships**
- Gas Terminology
- Typical Gas Reactions
- Underbalanced drilling
- Connection Gas Uncertainty
- 10-10-10 - Isolating Gas Events
- Gas Ratios
- Summary

**Exercise:** Calculation of Pore Pressure from DXC and Using Background Gas & Gas Events

**Gas Relationships**

**Geothermal Gradient**
- Mud Temperature
- Plotting the FLT Data

**Mud Chlorides**

**Case Study:** How we got a wrong evaluation (Diagnosis & Analysis)

**Other Support Tool**
- LWD Tool Drilling Measurements and PWD
- Mud Flow In/Out and Pit Levels
- Pump Pressure
- Calcimetry

**Good Evaluation Practice**

**Case Study:** Unexpected Pore Pressure Increase

**Post Well Evaluations**
- End of Well Reporting

Day Five: Prevention and Management of Influxes & Kicks

**Overview**
- What is an Influx?
- Causes of Influxes?
- Influences on Kick Severity
- How do we stop an influx?

**How do we recognize an influx?**
- When do influxes occur?
- Influx Detection by Operation
- Actions on Detecting an Influx
- Example of a Kick While Circulating

**Kick Evaluation**
- Initial Kick Evaluation
- Other Required Data
- Equations and Calculations

**Exercises:** Calculation of Kill Density and Influx Type from Shut-In Pressures and Well Data

**Well Kill Processes**
- Description of Well Kill Methods
- Complications
- End of Kill Processes

**Geologists’ Roles in Kick Control**
- Wellsite Geologist
- Operations Geologist
- The “Post Mortem”

**Course Summary and Conclusion**
Petrosync Distinguished Instructor

TIM HERRETT
Founder, Principal Consultant, Tim Herrett Ltd

Tim has over 30 years experience as both a wellsite and operations geologist, specializing in pressure evaluation in High Pressure and High Temperature wells. Since 2000, he has worked on HPHT wells for ExxonMobil and BP for pore pressure projects and training manuals. He is the Founder and Principal Consultant of his own consulting firm, Tim Herrett Ltd, where he provides various services to upstream oil industry. He has been a wellsite and operations for over three decades now, and has gained expertise in wellsite data management. He is the author and presenter of renowned industry training courses worldwide on subjects including Wellsite Geology, Operations Geology, Formation Pressure, and Wellsite Data Management. He still periodically works in the field as a senior wellsite geologist specializing in pressure evaluation in deep, HTHP wells.

He has previously provided major operations and wellsite support for ExxonMobil in Norway and Houston, and has written operations and wellsite geology procedures manuals for ExxonMobil Exploration, Development, and Production Companies. He has also worked for other operators including Petroleum Deminex, Amerada, Hess, StatOil, Fina, and Conoco.

Before building his own consulting firm, Tim was with Cambrian Consultants for 13 years as a Senior Wellsite Geologist, Technical Director and Trainer, with responsibilities to IT infrastructure and technical training programs. He further designed and developed software for wellsite and office use which are now commercially used in the industry.

Tim has been heavily involved in training throughout his career either on a one to one basis at the wellsite or presenting to classes. Over the last 15 years has written and presented a number of well-received courses on wellsite and operations geology and pore pressure evaluation to the oil industry. Tim is currently the principal presenter of BP’s in-house Operations Geology course. He is also a part time lecturer in Wellsite/Operations Geology and Wellsite Data Management on the petroleum geoscience master’s degree at the Universities of Manchester and Derby in the UK.

MR. HERRETT’S PARTIAL CLIENT LIST

- BP
- Exxon
- Talisman Energy UK
- Talisman Norge
- ENI
- PetroVietnam
- Petronas
- Nexen
- RuhrGas
- Conoco Phillips
- British Gas
- Deminex
- Amerada Hess
- RAG

PROGRAM SCHEDULE

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:00</td>
<td>Registration (Day 1)</td>
</tr>
<tr>
<td>09:00</td>
<td>Session I</td>
</tr>
<tr>
<td>11:00</td>
<td>Refreshment &amp; Networking Session I</td>
</tr>
<tr>
<td>11:15</td>
<td>Session II</td>
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<tr>
<td>13:00</td>
<td>Lunch</td>
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<tr>
<td>14:00</td>
<td>Session III</td>
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<tr>
<td>15:30</td>
<td>Refreshment &amp; Networking Session II</td>
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<tr>
<td>15:45</td>
<td>Session IV</td>
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<td>17:00</td>
<td>End of Day</td>
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Title : FORMATION PRESSURE PREDICTION & EVALUATION
Date : 17th - 21st August 2015
Location : Bali, Indonesia

INVESTMENT PACKAGES

<table>
<thead>
<tr>
<th>Investment Package</th>
<th>Deadline</th>
<th>Full Masterclass Price</th>
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<tbody>
<tr>
<td>Standard Price</td>
<td>14 AUG 2015</td>
<td>SGD $ 5,995</td>
</tr>
<tr>
<td>Early Bird Offer</td>
<td>17 JUL 2015</td>
<td>SGD $ 5,795</td>
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<tr>
<td>Group Discount (3 or more Delegates)</td>
<td>14 AUG 2015</td>
<td>10% discount for groups of 3 registering from the same organization at the same time</td>
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Group Discount is based on Standard Price

* To enjoy the promotion & discount offer, payment must be made before deadline
* 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: ____________________________
Department: ____________________________
Address: ____________________________
Country: ____________________________
Email: ____________________________

2nd Delegate Name: ____________________________
Direct Line Number: ____________________________
Job Title: ____________________________
Department: ____________________________
Address: ____________________________
Country: ____________________________
Email: ____________________________

3rd Delegate Name: ____________________________
Direct Line Number: ____________________________
Job Title: ____________________________
Department: ____________________________
Address: ____________________________
Country: ____________________________
Email: ____________________________

INVOICE DETAILS

Attention Invoice to: ____________________________
Company: ____________________________
Address: ____________________________
Fax: ____________________________
Email: ____________________________
Country: ____________________________
Postcode: ____________________________

PAYMENT METHODS

- By Credit Card: Please quote invoice number(s) on remittance advice
  - Visa
  - MasterCard
  - AMEX
  - Security Code: _____________

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

CHARGES & FEE(s)

- For Payment by Direct Telegraphic Transfer, client has to bear both local and overseas bank charges.
- For credit card payment, there is additional 4% credit card processing fee.

CERTIFICATE OF ATTENDANCE

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

DETAILS

Please accept our apologies for mail or email that is incorrectly addressed.
Please email us at registration@petrosync.com and inform us of any incorrect details. We will amend them accordingly.

PetroSync Global Pte Ltd Bank details:
Account Name: PetroSync Global Pte Ltd
Bank Name: DBS Bank Ltd
Bank Code: 7171 - Bank Swift Code: DBSSSGSGXXX - Branch code: 288
Account No: SGD: 2889018980 - USD: 0288002682016

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

Course Confirmation

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.