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Wellsite Operations Training Courses 2018

Wellsite Geology
Mudlogging
Formation Evaluation
Drilling Technology



www.stag-geological.com

Training Overview

Scheduled Open Courses

Since 1995 Stag have been providing wellsite operations and formation evaluation training courses for personnel from Major Operators and Service Companies throughout the world. We provide regular open sessions at our training centres in Reading, U.K. and Perth, Western Australia.

In-House Programmes

All our programmes can be presented in-house. Recently we have given given courses London, Perth (Australia), Houston, Cape Town and Denmark

Bespoke Course Design

We can design programmes to suit your specific needs for presentation at any time, in any location, world-wide.

Course Accreditation

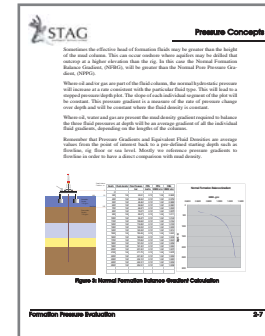


The
Geological
Society

accredited training course

We have recently received accreditation from The Geological Society of the United Kingdom for the following courses:

- WO1: Introduction to Drilling & Wellsite Geology
- G2: Operations & Wellsite Geologist
- FE1: Basic Log Interpretation
- P1: Formation Pressure Evaluation



Bespoke Training

- All our scheduled public courses are available to organisations on a proprietary basis for presentation at any location, world-wide at a mutually convenient time
- Rates for proprietary courses are based upon location, course length, numbers of participants and the need for any re-design to suit specific requirements

In-House Programmes



STAG Well Planning Training

WPFT1: Geological control on drilling performance

Target Audience

- Geologists and drilling personnel
- Geotechnical Engineers
- Drilling Engineers
- Environmental Engineers
- Geotechnical Engineers
- Well Planning Engineers

Course Length

1 Day

Course Style

Hands-on practical exercises, lectures, case studies, group work, presentations, and a final assessment.

Workshop Overview

This course is designed for geologists and drilling engineers who are involved in the design and execution of drilling operations. It covers the geological control on drilling performance, including the identification of geological hazards and the design of drilling strategies to avoid them.

Course Summary

This course provides a comprehensive overview of the geological control on drilling performance. It covers the identification of geological hazards, the design of drilling strategies, and the execution of drilling operations. The course is designed for geologists and drilling engineers who are involved in the design and execution of drilling operations.



STAG Wellsite Operations Training

G2: Operations & Wellsite Geology

Target Audience

- Geologists
- Drilling Engineers
- Environmental Engineers
- Geotechnical Engineers
- Well Planning Engineers
- Wellsite Operations Engineers

Course Length

2 Days

Course Fee

£2500 (incl VAT)

Operations & Well Planning

- Well Planning
- Drilling
- Wellsite Operations
- Wellsite Geology
- Wellsite Geotechnical Engineering
- Wellsite Environmental Engineering
- Wellsite Geotechnical Engineering
- Wellsite Environmental Engineering

Wellsite Geology

- Wellsite Geology
- Wellsite Geotechnical Engineering
- Wellsite Environmental Engineering
- Wellsite Geotechnical Engineering
- Wellsite Environmental Engineering

Geological Control & Geosourcing

- Wellsite Geology
- Wellsite Geotechnical Engineering
- Wellsite Environmental Engineering
- Wellsite Geotechnical Engineering
- Wellsite Environmental Engineering

Course Dates 2018



January

| | | | |
|-----------|-------------------------------------|---------|---|
| 03-05 | FE1: Basic Log Interpretation | Reading |  |
| 15-18 | G2: Operations & Wellsite Geologist | Reading |  |
| 29-02 Feb | WO1: Introduction to Drilling & WSG | Reading |  |

February

| | | | |
|-------|-----------------------------------|---------|---|
| 12-14 | P1: Formation Pressure Evaluation | Reading |  |
|-------|-----------------------------------|---------|---|



March

| | | | |
|-------|-------------------------------------|---------|---|
| 07-09 | FE1: Basic Log Interpretation | Reading |  |
| 12-15 | G2: Operations & Wellsite Geologist | Reading |  |

April

| | | | |
|-------|-------------------------------------|---------|---|
| 09-13 | WO1: Introduction to Drilling & WSG | Reading |  |
| 16-18 | P1: Formation Pressure Evaluation | Reading |  |

May

| | | | |
|-------|-------------------------------------|---------|---|
| 16-18 | FE1: Basic Log Interpretation | Reading |  |
| 21-24 | G2: Operations & Wellsite Geologist | Reading |  |

June

| | | | |
|-------|-------------------------------------|---------|---|
| 25-29 | WO1: Introduction to Drilling & WSG | Reading |  |
|-------|-------------------------------------|---------|---|

July

| | | | |
|-------|-------------------------------------|---------|---|
| 04-06 | FE1: Basic Log Interpretation | Reading |  |
| 09-12 | G2: Operations & Wellsite Geologist | Reading |  |

September

| | | | |
|-------|-------------------------------------|---------|---|
| 19-21 | FE1: Basic Log Interpretation | Reading |  |
| 24-27 | G2: Operations & Wellsite Geologist | Reading |  |

October

| | | | |
|-------|-------------------------------------|---------|---|
| 15-19 | WO1: Introduction to Drilling & WSG | Reading |  |
| 22-24 | P1: Formation Pressure Evaluation | Reading |  |

November

| | | | |
|-------|-------------------------------------|---------|---|
| 14-16 | FE1: Basic Log Interpretation | Reading |  |
| 19-22 | G2: Operations & Wellsite Geologist | Reading |  |

December

| | | | |
|-------|-------------------------------------|---------|---|
| 03-07 | WO1: Introduction to Drilling & WSG | Reading |  |
|-------|-------------------------------------|---------|---|





Target Audience

- Wellsite Geologists
- Operations Geologists
- Mud Loggers
- MWD Operators
- Directional Drillers
- Technical & Support Staff

Course Length

4 days

Course Fee

£1950 (+VAT)

Operations & Well Planning

- Well Planning Processes
- Geological Prognosis
 - Geology & Stratigraphy
 - Pore Pressure/Fracture Gradient
 - Site Survey & Shallow Gas
 - Other Geological Hazards
- Geological Data Acquisition Procedures

Wellsite Geology

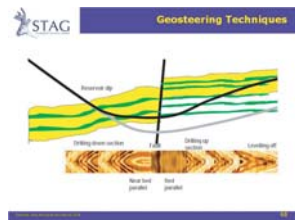
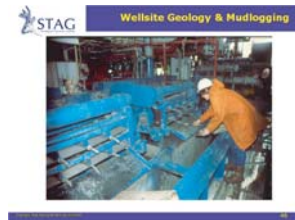
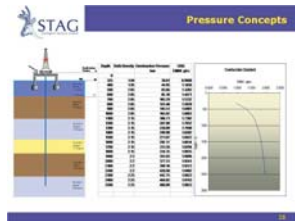
- Duties and Responsibilities
- Supervision of Wellsite Services
 - Mudlogging
 - Coring
 - Wireline Logs
 - MWD
- Lithology and Completion Logs
- Geological Reports

Geological Control & Geosteering

- Wellsite Geological Techniques
 - Drill Cuttings Evaluation
 - Gas Evaluation
 - Log Interpretation

- Geosteering Techniques
 - Drilling Overburden
 - Landing the Well
 - Drilling the Reservoir

G2: Operations & Wellsite Geology





Course Aims

To provide an overview of the role of Operations and Wellsite Geologists in Well Planning and Drilling Surveillance phases. To provide practical instruction in wellsite geological techniques and geosteering co-ordination.

Delegates will learn how to:

- Describe & Evaluate drill cuttings
- Produce a Formation Pressure Profile to include estimated pore pressure and fracture gradient data
- Determine Lithology and Reservoir information from well logs
- Use Mudlogging and MWD data to perform real-time geosteering co-ordination

Operations Geology Overview

Duties & Responsibilities
Well Planning Processes
G&G Chapter of Drilling Programme
Geology & Stratigraphy
Pressure Profile
Site Survey & Shallow Gas
Geological Hazards
Data Acquisition Procedures
Provision of Wellsite Services
Identification & Selection
Logging Programmes
Data Management & Distribution
Technical Support

Wellsite Geology

Duties and Responsibilities
Supervision of Wellsite Services
Mudlogging Services
Mudlogging Units
Sensors
Data Acquisition
Gas Detection
Sampling and Cuttings Evaluation
Depth and ROP
Coring Services
Conventional
Sidewall
Coring Procedures
Retrieval and Packing

G2: Operations & Wellsite Geology

Wireline Logs

Witnessing & QA Procedures
Quick-Look Log Interpretation
MWD/LWD Services
Directional Surveys
Formation Evaluation Services

Documentation & Reports

Daily/Weekly
Lithlog & Composite Log Preparation
End-of-Well Report

Practical Wellsite Geology

Description & Evaluation of Drill Cuttings
Oil Show Evaluation
Basic Log Interpretation
Construction of Lithlog from cuttings and log data

Geosteering & Geological Control

Strategies & Teamwork
Horizontal & ERD Formation Evaluation
Geological Targets
Structural & Well Path control
Landing the Well
Drilling the Reservoir
Calling T.D.

Geosteering Case Study

Real-time geosteering case study using LWD, MWD & Mudlogging data in a role-play exercise



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Target Audience

- Wellsite Geologists
- Operations Geologists
- Mud Loggers
- Drilling Engineers
- Directional Drillers
- MWD Operators
- Technical & Support Staff

Course Length

5 days

Course Fee

£2050 (+VAT)

WO1: Introduction to Drilling & Wellsite Geology

Drilling Technology

- Well Planning & Rig Selection
- Drilling Equipment & Techniques
 - Drillstring Design & Bit Technology
 - Drilling Fluids & Well Control
 - Casing & Cementing
 - Directional Drilling

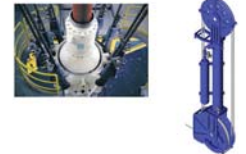
Wellsite Geology & Mudlogging

- Data Acquisition Systems
- Evaluation of Drill Cuttings
- Gas Detection Equipment
- Lithology Logs
- Safety Monitoring

Formation Evaluation

- Cuttings Descriptions
- Coring Procedures
- Wireline Logging
- Measurement While Drilling
- Oil & Gas Show Evaluation
- Geosteering Techniques

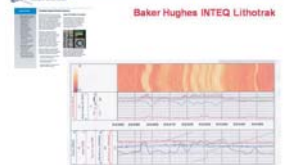
STAG Pipe Handling/Motion Compensation



STAG Wellsite Geology & Mudlogging



STAG MWD Overview





Course Aims

To provide an introduction to drilling technology and wellsite geological techniques for those personnel new to the industry or transferring from non-operational roles.

Delegates will learn:

About the fundamental processes of drilling oil and gas wells

About the rig types, onshore and offshore drilling techniques, the drillstring components, drill bits, drilling fluids, casing and cementing operations, well control and directional drilling operations

How wellsite geologists collect & interpret geological data during the drilling process

About Surface data Logging, Coring, Wireline Logging and LWD Services

About, and receive instruction and hands-on practice in, the microscopic description of drill cuttings and oil shows

WO1: Introduction to Drilling & Wellsite Geology

Drilling Rigs

Land Rigs
Offshore Rigs
Platforms

Drilling Technologies

Bit Technology

Design: Roller cone; PDC
Applications

BHA Design, Drill Pipe
Hoisting, Rotating, Motion Compensation
Well Control Equipment
Drilling Fluids

Properties & Specifications
Fluid Systems:

Oil Based Mud
Water Based Mud
Polymer Fluids
Synthetic Systems

Fluid Circulation System
Hydraulics Calculations
Casing and Cementing
Directional Drilling

Applications
Steering Systems
Formation Evaluation
Survey Processes/calculations

Drill Returns Logging

Mud Logging Services
Cuttings Recovery
Lag Time Calculations
Depth and ROP Recording
Hydrocarbon Gas Evaluation
Total Gas
Chromatographic Analysis
Interpretation of Gas Shows

Wellsite Geology

Cuttings Sampling and Preparation
Cuttings Description
Clastics
Carbonates
Evaporites
Reporting Procedures
Lithology Logs
Oil and Gas Show Evaluation
UV Light and Solvent tests

Coring Operations

Conventional Coring
Sidewall Cores

Formation Evaluation

Wireline Logging Operations
MWD Operations



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Target Audience

- Wellsite Geologists
- Operations Geologists
- Mud Loggers
- MWD Operators
- Directional Drillers
- Technical & Support Staff

Course Length

3 days

Course Fee

£1500 (+VAT)

Obtaining Well Logs

The nature of well logs
Conveyance Methods
Borehole Environment
Invasion
Log Scales and Presentation
Theory of Operation
Gamma Ray
Resistivity
Neutron Porosity
Density
Sonic

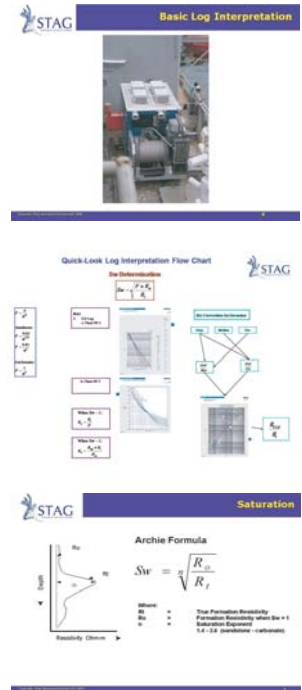
Log Interpretation

Log QC
Lithology Determination
Gamma & S.P.
Density/Neutron Logs
Crossplots
Facies & Environments

Reservoir Evaluation

Recognition of Permeability
Identification of Hydrocarbons
Fluid types & contacts
Porosity and Permeability Determination
Water Saturation (Sw) estimation

FE1: Basic Log Interpretation



Basic Log Interpretation

Quick-look Log Interpretation Flow Chart

Archie Formula

$$S_{Wf} = \sqrt{\frac{R_{oi}}{R_t}}$$

Where:
 R_{oi} = True Porosity Resistivity
 R_t = Formation Resistivity when $S_w = 1$
 1.0 = 1.0 porosity - saturation



Course Aims

To enable delegates to determine lithology, reservoir and pore fluid characteristics using Quick-Look log interpretation techniques from traditional open hole Wireline and LWD logs.

Delegates will learn how to:

- Identify lithology from well logs
- Identify and evaluate potential reservoir rocks
- Determine porosity from Sonic, Bulk Density and Neutron Porosity logs
- Identify and evaluate hydrocarbon bearing zones and calculate Sw using Archie and graphical methods
- Correct for borehole and environmental conditions

Wireline Logs: Basic Concepts

Types of Open Hole Logs
Information Required
Log Header
Relationships
Borehole Environment
Invasion Profiles
Rw & Rmf
Porosity and Permeability
Resistivity and Water Saturation
Temperature Corrections

Theory of Operation

Spontaneous Potential
Gamma Ray
Resistivity Logs
 Laterologs
 Induction Logs
 Microresistivity Logs
Neutron Porosity
Sonic
Formation Density
Dipmeter Tools

MWD & LWD Tools

Theory of Operation
Transmission Systems
Tool Configuration
Sensors
Operating Procedures and Practice
MWD/Wireline Response Comparison
Borehole Imaging Logs

FE1: Basic Log Interpretation

Geological Interpretation

Identification of Lithology
Environment and Facies
Identification of Permeability
Identification of Porosity
Geosteering Applications

Reservoir Evaluation

Quick Look Porosity Calculations
Identification of Hydrocarbon Bearing Zones
Hydrocarbon Type Evaluation
Saturation Calculations
 Archie
 Shaly sands
 Carbonates
 Resistivity Ratio
 Cross-Plots

Imaging logs

Sonic
Density
Resistivity

Case Studies and Worked Examples



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Target Audience

- Wellsite Geologists
- Operations Geologists
- Mud Loggers
- MWD Operators
- Drilling Engineers
- Directional Drillers
- Technical & Support Staff

Course Length

3 days

Course Fee

£1500 (+VAT)

Well Planning

Planning Wells with a safe operating window
Health, Safety, Security and Environment
Drilling HPHT Wells
Shallow Gas

Pressure Concepts and Gradients

Definitions and Normal Pore Pressure
Overburden Pressure Calculations
Pressure Gradient Calculations
Fracture Pressure Calculations & Modelling

Abnormal Pressure

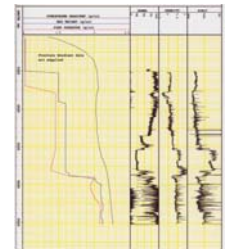
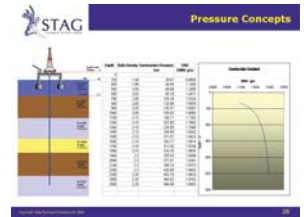
Causes of Abnormal Pore Pressure
Pore Pressure Prediction from:
Dxc, ROP, Mud-Gas relationships
Resistivity, Sonic, Density data
Borehole Stability: cavings
torque and drag, overpull

Fracture Pressure

Evaluation of Rock Fracture Pressure:
Leak-Off Tests
Mathematical Modelling
Kick Tolerance

Well Control Procedures

P1: Formation Pressure Evaluation





Course Aims

To familiarize delegates with the challenges of planning and drilling wells in a safe operating window to minimise Health and Safety Incidents and Non-Productive Time.

To provide practical instruction in pore pressure and fracture pressure prediction to produce PPFPG plots.

Delegates will learn:

- How to calculate and plot normal hydrostatic pore pressure and overburden pressure
- About the mechanisms that generate abnormal pore pressures
- How to calculate fracture pressure for LOT data and mathematical models
- How to produce PPFPG plots from offset well data

Introduction

Well Planning Requirements
Safe Operating Window (PP-FG)
Pore Pressure prediction and detection
Wellbore Stability
Fracture Pressure

Health, Safety, Security, Environment

Requirements and Well Planning
Recent Incidents
Operator Responsibilities
Individuals' Responsibility
General Duty

HP/HT Drilling: Definitions & Challenges

Definitions of HPHT
High Fluid Density
High Formation Temperature
Narrow Operating Windows
Managed Pressure Drilling

Formation Pressure Evaluation

Fundamentals
Hydrostatic Pressures
Pressure Gradients
Elevations and Datums
Formation Balance Gradient
RFT data and PZ plots
Overburden Pressure Gradient
Data Sources
Calculation methods

P1: Formation Pressure Evaluation

Origin of Abnormal Pore Pressure

Compaction Disequilibrium
Aquathermal Processes
Clay Diagenesis
Stratigraphic Processes
Tectonic Processes
Fluid Expansion

Practical Formation Pore Pressure Evaluation

Seismic Data
ROP and Dxc
Formation Gas Evaluation
Borehole Behaviour
Drilling Parameters
Drill Cuttings and Cavings
Geothermal Gradients
Wireline/MWD Data

Methods

Trend Line Methods
Ratio
Eaton
Equivalent Depth
Unloading
Bowers

Fracture Pressure Gradients

Leak-off Tests
Mathematical Modelling
High Angle wells

Kick Tolerance

G1: Introduction to Geology

Target Audience

- Drilling Engineer
- Directional Drillers
- MWD Operators
- Bit Design Engineers
- Drilling Fluids Engineers
- Technical Assistants
- Office Support Staff

Course Length

3 days

Course Fee

£1500 (+VAT)

Geological Processes

Structure of the Earth

- Stratigraphy & the Time Scale
- Rock Classification
 - Sedimentary Processes
 - Surface Processes
- Environments of Deposition

Structural & Petroleum Geology

- Bedding & Lamination
- Dip & Strike
- Folding
- Faulting
- Geological maps
- Petroleum Geology
- Origin & Migration
- Reservoirs & Traps
- Reservoir Fluids

Sedimentary Petrology

- Grains & Minerals
- Textures
- Porosity & Permeability
- Pore Fluids
- Log Interpretation
- Wellsite Geology & Drilling



G1: Introduction to Geology

Course Aims

To provide an introduction to petroleum geology and practical wellsite geological procedures for engineers and those without formal geological training.

Delegates will learn how to:

- Recognize the physical and chemical properties of the major sedimentary rocks
- Examine hand specimens and drill cuttings of all the major rock types
- Understand sub-surface structures and basic reservoir geology
- Understand the effect of geology on key drilling practices
- Interpret lithology & geological features from LWD & Wireline Logs

Introduction to Geology
 Structure of the Earth
 Plate tectonics/Continental Drift
 The Geological Time Scale
 Stratigraphy and Fossils
 Rock Forming Minerals
 Rock Classifications
 Igneous
 Metamorphic
 Sedimentary

Sedimentary Rocks

Classification Schemes:
 Clastics
 Carbonates
 Chemical Rocks

Geological Processes

Surface Processes
 Weathering, Erosion, Transportation
 Environments of Deposition
 Continental
 Fluvial
 Marine

Depositional Features

Bedding & Lamination
 Sedimentary Features
 Erosional Features

Structural Geology

Dip & strike, Folding and Faulting

Geological Maps
 Creating surface maps from outcrop data
 Drawing structural cross sections

Petroleum Geology
 Origin of Hydrocarbons
 Migration
 Traps
 Reservoir Properties

Sedimentary Petrology

Mud Rocks:
 Textures, Colours, Mineralogy, Environments

Sandstones:
 Grain Texture, Components, Cements, Porosity and Permeability, Environments
Carbonates:
 Components, Grains, Cement/Matrix, Diagenesis, Environments, Dunham Classification

Chemical Rocks:
 Evaporites, Others

Drill Cuttings /Oil Show Evaluation
 Sample Collection/Processing
 Sample Description & Analysis
 Oil Show Evaluation

LWD & Wireline Logs
 Lithology from Basic Open Hole Logs

WPFT1: Geological control on drilling performance

Target Audience

Subsurface and Drilling personnel involved in Well Planning and Delivery:

- Well Planning Engineers
- Drilling Engineers
- Exploration Geologists
- Operations Geologists
- Wellsite Geologists

Course Length

5 Days

Course Style

A practical workshop, predominately field based using locations in and around Dorset and Somerset, southern UK.

Workshop Overview

A short field course to examine Geological control and influence on drilling predictability and performance.

This trip is suitable for all Subsurface and Drilling personnel involved in Well Planning and Delivery.

Course Summary

The standard workshop is based in Dorset and travels to other locations in Somerset.

Bespoke workshops can be designed around other areas of relevant geology specific to client requirements. This is particularly useful if a team wants to gain an appreciation of drilling considerations around a particular stratigraphy, structure or lithology, or perhaps to gain a better understanding of perceived or historically recognised problems.



WPFT1: Geological control on drilling performance

Course Aims

To examine rocks in the field and build a mutual understanding, within the team, of why rocks drill the way they do.

- To understand the geological significance to drillers.
- To understand the drilling significance to geologists.
- To appreciate geology that is predictable and what is not.
- To help reduce uncertainty and geological NPT.
- To promote the value of field and outcrop analogue, in the well planning process.
- To improve performance in a cost challenged environment.

Delegates will learn that:

- During post-well evaluation of drilling problems it is often apparent that warning signs were missed, not recognised or ignored.
- Inappropriate reaction to observed warning signs often exacerbate or escalate problems.
- Many geology related issues experienced while drilling, or geological NPT, can be predicted and mitigated during well planning.
- Appropriate mitigation to unforeseen geological events experienced while drilling can be developed and promoted within a team to ultimately yield improved performance.

Common Scenarios

Scenarios that are considered and measured during this workshop:

- An event that was identified and predicted during the well planning process that became managed.
- An event that was identified and predicted during the well planning process but was worse than anticipated while drilling, but with appropriate planning as actively managed with little NPT.
- An event that was not predicted during planning, but due to enhanced reaction and mitigation planning, was managed with some NPT, but a significant event was avoided.
- An event that was not predicted during planning, was difficult to manage and resulted in significant NPT.

WPFT1: Geological control on drilling performance

Discussion Topics

- Drilling unconsolidated, and poorly cemented sands
- Mudrocks matter to drillers!, and getting to grips with gumbo
- Sandstones, Chalk, Marl and Limestone - Planning for and managing losses
- Geological Scale -Seismic vs log resolution vs outcrop scale
- Faults, folds and other geological structures at various scales, and the problems that they can cause
- Bedding, Joints and other discontinuities and their influence on drilling
- Hard bands and negative drill breaks
- Geological control on directional drilling and geosteering
- Ledging, Key-seating and wellbore geometry
- Considerations for casing running and shoe positioning
- Predicting and mitigating drilling problems during the well planning process
- Using drilling data to interpret geology in the absence of logs
- Geosteering, geostopping and geology at the bit
- Predicting and mitigating wellbore Instability
- Understanding how geological uncertainty adds to the challenge of drilling
- Reservoir, Source and Seal rocks, Oil seeps



Instructor Profile



Martin B. Saunders
Training Manager

has forty two years experience as wellsite geologist and technical training manager. He specializes in wellsite operations and petroleum geology training and has been teaching oilfield courses for twenty five years. Martin holds a B.Sc. (Hons.) degree in geology from the University of Wales, Aberystwyth and began his career with EXLOG (now Baker Hughes Inteq) in 1974 and worked at the wellsite before joining the training department of Baker Hughes in the UK in 1982. Here he was responsible for all internal technical training for the Europe/Africa/Middle East Division and was also responsible for the expansion of its external, commercial training operations. He has presented courses throughout the world to personnel from major operators and service companies including BP, Exxon, Chevron, Maersk, Total, Wintershall, Perenco, ADNOC, Saudi Aramco, GDF Suez, Tullow Oil, Baker Hughes and Halliburton among many others.

Training Centre Locations

Reading, Berkshire, U.K.

3 Fortuna Court, Calleva Park
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Aberdeen, Scotland, U.K.

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