Geological Application of Well Logs

Designed for:
The course is aimed towards geoscience professionals who are starting to familiarise themselves with logs and wish to use log data to further enhance their evaluations. Additionally, the course will provide an excellent refresher for more experienced geoscientists as well as engineers.

Duration
(days)

1 2 3 4 5
flexible

Learning Level:

Skills
Knowledge
Awareness

This course introduces the principles of qualitative applications of open-hole well logs for the subsurface professional.

It is designed to demonstrate how single logs, combined logs and supporting data can be integrated and used to understand mineralogy, lithology, depositional environments and key stratigraphic surfaces or events. A generic approach enables the principles and workflows to be applied to modern logs as well as older legacy data.

Specific learning objectives are:

- Appreciate the functions, physical principles and limitations of logging tools used in a standard logging suite and their role in understanding the geology

- Understand the similarities differences between logs acquired using wireline conveyance downhole and those acquired whist drilling (LWD) and data from different vintage

- Use well logs to identify lithology and interpret facies in addition to stratigraphic and structural features

- Analyse well logs in conjunction with core and other well data to produce a coherent geological evaluation of a well

- Use the well log data to build a geological correlation

- Perform a quicklook petrophysical analysis of Vshale, Porosity and water saturation

- A basic understanding of image and dipmeter log interpretation

- Appreciate the limits and uncertainties of the workflows used

The classroom-based course uses a combination of lectures and exercises using real data to build an understanding of the merits and pitfalls of individual logs. The course progresses to use a combination of logs to build a geological evaluation of a well and ultimately a correlation scheme(s). The course materials include a copy of the text book "Geological Interpretation of Well Logs" by Malcolm Rider and Martin Kennedy (3rd edition).

Well log data has been utilised for many years by petrophysicists to generate rock properties using quantitative evaluation. However, for the geologist, geophysicist, geomechanical and reservoir engineer there is a wealth of qualitative and quantitative well log data that can feed in to all types of subsurface evaluation.

Each logging tool is described in terms of basic functions, physical principles and geological interpretation (both wireline and LWD). A combined log data set is then used for lithology interpretation, facies recognition log sequence analysis and correlation. Finally, basic rock properties are calculated to provide a full log evaluation.

Early Development   Business & Risk
E&P Overview   Open Air
Reservoir   Coaching
Wells   Master Class

Geological Application of Well Logs continued

Course Content:

NOTE: The following timetable is only a guide and can vary depending on the experience level of the class

Day 1:

- Introduction
- Logging Environment
- Introductory Worksession
- Simple Gamma Ray
- Worksession: Caliper and Gamma
- Spectral Gamma Ray

Day 2:

- Worksession: Spectral Gamma Ray
- Resistivity – Theory and Tools
- Worksession: Resistivity
- Resistivity – Geology
- Sonic Logging
- Worksession: Sonic
- Well Tying and Modern Sonic Logs

Course Duration:

Duration is 3 -5 days.

Courses available from this series:

Basic Geoscience
Introduction to Geophysics
Geological Application of Well Logs
Openhole Petrophysical Interpretation
Core Description
Production Geology
Applied Production Geology
Reservoir Model Design
Fractured Reservoir Characterisation
Geology for Drilling Engineers
Reservoir Engineering
Applied Reservoir Engineering
Well Test Design & Analysis
Logging While Drilling
Basin Analysis
Geomechanics
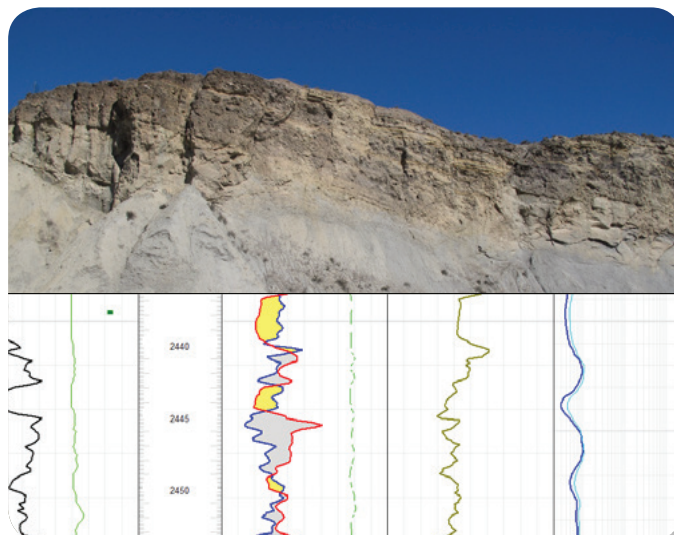
Day 3:

- Density Logs
- Worksession: Density
- Neutron Logs
- Density Neutron Combination
- Lithology
- Worksession: Lithology
- Dipmeter

Day 4:

- Core Photos – log comparison
- Image Logs
- Worksession: Image logs
- Facies and Sequences from Logs
- Worksession: Log Sequence Analysis
- Correlation

Day 5:

- Stratigraphy and Correlation with logs
- Worksession: Correlation
- NMR
- Basic Petrophysics
- Worksession: Basic petrophysical workflow
- Finish

Course Tutor

Jenny Garnham PhD

Main Series tutoring: Reservoir, Open Air
Industry experience: over 20 years, petrophysics
Career background: Enterprise Oil, AGR and TRACS
Personal: Technical author, SPWLA active member, PESGB/SPE

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