
N003: Geological Interpretation of Well Logs

Format and Duration

Instructor(s): Jenny Garnham / Dawn Houlston / Martin Kennedy

Classroom - 5 Days

Summary

This course is an introduction to the principles and applications of conventional well logs. It shows how combinations of logs can be used to interpret mineralogy, lithology, facies, depositional environments and key sequence stratigraphic markers such as flooding surfaces. Sessions start by considering the individual measurements but as the course progresses there is an increasing emphasis on combinations of measurements and the trends with depth. The climax of the course is an exercise to produce a robust correlation scheme using data from three wells.

Business Impact: The ultimate objectives of this course are to be able to use sets of well logs to establish robust **correlation schemes**, **guide well placement** and **derive property inputs** for geological modelling. These skills will enable participants to reduce risk, understand uncertainty, improve success rates, and reduce costs throughout the life cycle of subsurface projects.

Participants will receive a digital copy of the text book “Geological Interpretation of Well Logs” by Malcolm Rider and Martin Kennedy.

Learning Outcomes

Participants will learn how to:

1. Differentiate the functions, physical principles, and limitations of logging tools used in a standard logging suite and their applications for geological interpretation.
2. Understand the differences between logs acquired using wireline conveyance and logs acquired whilst drilling.
3. Use well logs to determine lithologies, interpret facies, and identify stratigraphic and structural features.
4. Interpret well logs and integrate with other available data, such as core and cuttings, to produce a coherent geological evaluation.
5. Correlate between wells using well logs, incorporating other available down-hole data.
6. Analyse the interpretation patterns of imaging and dipmeter tools to indicate structural and stratigraphic features.
7. Undertake a quicklook analysis to calculate shale volume, porosity, and water saturation from well logs.

Training Method

This is a classroom course comprising a mixture of lectures, discussion, case studies, and practical exercises.

Who Should Attend

This course best suits those beginning to acquaint themselves with logs or those who do not use logs all



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the time and need a refresher. The course is aimed primarily at inexperienced Geoscientists, but is also good for new-hire Petrophysicists and experienced Technologists, Reservoir and Petroleum Engineers.

Course Content

In this class, each individual logging tool is described in terms of basic functions, physical principles and geological interpretation. Log data is then used as a complementary set for lithology interpretation, facies recognition, log sequence analysis and correlation.

The following timetable is intended as a guide only and may vary depending on the instructor and experience of the class.

Topic 01:

- Introduction
- Impact of Logging
- Environment and Deployment
- Depth Shifting Exercise
- Log Summary Exercise

Topic 02:

- Gamma and Spectral Gamma Ray Theory and Usage
- Understanding Caliper
- Worksession: Caliper and Gamma Ray
- Worksession: Spectral Gamma Ray

Topic 03:

- Resistivity Logs
- SP Logs
- Worksession: Resistivity Profiles

Topic 04:

- Traditional Sonic Logging
- Well Tying and Modern Sonic Logs
- Worksession: Sonic Conversion

Topic 05:

- Density Logs
- Worksession: Shale Density
- Neutron Logs



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- Density Neutron Combination

Topic 06:

- Integrating Lithology
- Worksession: Lithology Log
- Introduction to NMR

Topic 07:

- Dipmeter
- Image Logs
- Worksession: Image logs

Topic 08:

- Core Photo and Logs
- Facies and Sequences from Logs
- Worksession: Sequence Analysis

Topic 09:

- Stratigraphy and Correlation with Logs
- Worksession: Correlation of 3 Wells

Topic 10:

- Basic Rock Property Evaluation
- Worksession: Basic Petrophysical Workflow