

Petrophysics Fundamentals and Well Log Interpretation Training Course

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Overview

Petrophysics Fundamentals and Well Log Interpretation Training Course is a one-week foundation course for graduate geoscientists, junior petrophysicists, engineers, and subsurface staff who leave with a Foundation Petrophysical Evaluation Workbook. Participants connect basic well log interpretation, formation evaluation workflow, lithology and shale volume, porosity and water saturation, and core log integration with data quality, net-reservoir decisions, and uncertainty. Agile Leaders Training Center presents foundation petrophysics and formation evaluation.

Who Should Attend

- Early-career geoscience functions responsible for describing formations and supporting reservoir studies
- Junior petrophysics functions responsible for log quality checks and basic interpretation
- Reservoir engineering functions responsible for using porosity, saturation, and net-pay inputs
- Drilling and completions functions responsible for recognizing formation-evaluation data and limitations
- Technical data functions responsible for preparing well logs, core results, and interpretation records

The course assumes participants can read basic geological and engineering data, and it leaves out advanced multimineral inversion, cased-hole evaluation, geomechanical modeling, and software-specific operation.

Departments and Industries

The course supports departments and industries that use petrophysical evidence to describe subsurface formations.

- Oil and gas exploration, appraisal, and reservoir studies
- Geothermal resource evaluation and well planning
- Carbon storage site characterization and monitoring design
- Groundwater, mining, and engineering-geology investigations
- Geoscience consulting, laboratory services, and technical data management

Learning Objectives

By the end of this course, participants will be able to:

- Apply log-data quality and depth-reference checks
- Analyze conventional log responses for lithology and fluids
- Build shale-volume, porosity, and saturation calculations
- Use crossplots, core data, and permeability indicators
- Evaluate net-reservoir and net-pay cutoffs
- Compare deterministic results and uncertainty ranges

Course Agenda

Day 1: Prepare Formation-Evaluation Data

- Petrophysical Data Inventory and LAS File Checklist
- Measured-Depth and Datum Reference Alignment Sheet
- Caliper and Borehole-Condition Quality-Control Track
- Environmental Correction and Tool-Response Register
- Log Header, Units, Gaps, and Splice Review Method

Day 2: Read Conventional Well Logs

- Gamma Ray and Spontaneous Potential Response Chart
- Deep and Shallow Resistivity Separation Display
- Density, Neutron, and Sonic Measurement Comparison
- Lithology Indicator and Fluid-Effect Crossplot
- Conventional Log Interpretation Evidence Panel

Day 3: Calculate Reservoir Properties

- Clean-Formation and Shale-Volume Calculation Sheet
- Density-Neutron Crossplot Porosity Method
- Formation-Water Resistivity Estimation Worksheet
- Archie Water-Saturation Equation and Assumption Log
- Porosity-Saturation Sensitivity Table

Day 4: Integrate Reservoir Evidence

- Routine Core Analysis and Log Calibration Table
- Porosity-Permeability Relationship Screening Plot
- Reservoir and Nonreservoir Cutoff Decision Matrix
- Net-Reservoir and Net-Pay Summation Sheet
- Petrophysical Uncertainty and Data-Limit Register

Day 5: Practice Petrophysical Evaluation

- Suggested Exercise: Audit Log Quality and Depth Alignment
- Suggested Exercise: Interpret Lithology and Shale Volume
- Suggested Exercise: Calculate Porosity and Water Saturation
- Suggested Exercise: Apply Net-Pay Cutoffs and Core Checks
- Capstone Exercise: Complete the Foundation Petrophysical Evaluation Workbook

Practical Exercises

The course uses suggested activities to turn conventional logs and core measurements into a traceable formation evaluation.

- Suggested activity: identify borehole effects, missing curves, unit problems, and depth mismatches in a well-log set.
- Suggested activity: estimate lithology, shale volume, porosity, and water saturation from conventional curves and crossplots.
- Suggested activity: compare log-derived properties with routine core analysis and document scale differences.
- Suggested activity: calculate net reservoir and net pay while recording cutoff and uncertainty assumptions.

FAQs

Who suits petrophysics fundamentals and well log interpretation training, and what does it assume?

Petrophysics fundamentals training suits early-career geoscience, engineering, petrophysics, drilling, completions, and technical-data functions. It assumes participants can read basic geological and engineering information.

How does foundation petrophysics differ from advanced integrated formation evaluation?

Foundation petrophysics establishes conventional log responses, basic calculations, quality checks, and a first reservoir summary. Advanced integrated evaluation addresses complex mineral systems, probabilistic workflows, specialized measurements, and multidisciplinary reconciliation.

How are porosity and water saturation calculated from well logs?

Porosity is estimated from density, neutron, sonic, or crossplot responses after environmental and lithology checks. Water saturation combines resistivity, porosity, formation-water resistivity, and documented saturation-model assumptions.

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Why is core log integration important in formation evaluation?

Core log integration compares laboratory porosity, permeability, saturation, and lithology with continuous log-derived properties. Differences reveal scale, sampling, depth, borehole, and measurement effects that influence interpretation confidence.

How are net reservoir and net pay selected in basic petrophysics?

Net reservoir and net pay are selected with documented property and fluid cutoffs, applied consistently by interval and tested against data quality, core evidence, sensitivity, and the intended reservoir decision.

Conclusion

Participants take back a Foundation Petrophysical Evaluation Workbook containing quality checks, conventional-log displays, calculations, crossplots, core comparisons, cutoff decisions, and uncertainty notes. The workbook changes separate curves and measurements into a traceable first interpretation. It supports reservoir summaries, data reviews, multidisciplinary discussions, and decisions about further evaluation.

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