

## BETTER DECISIONS THROUGH THE RIGHT COMBINATION OF CAPABILITIES.

**Weatherford Laboratories** offers more capabilities under one roof than any other technical service option while focusing on customized solutions when assessing hydrocarbon reservoirs. These benefits help you make faster, better informed decisions about new opportunities or enable you to maximize recovery from depleted reservoirs, regardless of the play type.

Even though conventional reservoir risks may be “lower” than those in cutting-edge plays, you need accurate petrophysical and geochemical interpretations to measure the presence and content of the hydrocarbons to assess reservoir potential, and to avoid possible problems.

Reservoir analyses at **Weatherford Laboratories** are matched to your needs, from wellsite services to laboratory testing. Our adaptive approach applies to all sample types – conventional core, sidewall cores and cuttings or even outcrop samples or produced material. No matter your requirements, **Weatherford Laboratories** delivers analytical results to match your unique specifications which allows you to make more educated decisions in a timely fashion.

### INNOVATIONS

#### Papers/Studies

- Hundreds of papers presented at conferences, seminars and published in scholarly journals covering a broad spectrum of topics related to conventional hydrocarbon reservoirs
- Multiple studies in both deep-water and onshore in the areas of petrology, conventional core, special core, formation damage, fluid phase behavior, enhanced gas and oil recovery, and geochemistry



#### Technologies

- Core analysis results provided online via secure personal client websites
- CoreTrac™ – customized software developed for improved project management and laboratory efficiency
- One of first companies to provide Touchstone-compatible thin section composition point count, grain size, and grain coating analysis

### COMPREHENSIVE SERVICES. COMPLETE RESERVOIR CHARACTERIZATION.

#### Wellsite Stabilization & Transport

- Preserves crucial cores for precise laboratory analysis

#### Routine Core Analysis

- Conclusive indicator of hydrocarbons. Direct measurement of reservoir quality. Core data improves geological/engineering models

#### Core Photography

- High resolution digital or printed images in visible and UV light

#### Geochemistry

- Assess thermal maturity. Confirms organic content. Measures gas prospectivity

#### Petrographic Analysis

- Accurate descriptor of reservoir quality, mineralogy, compaction and cementation. Assessment of anomalous log response. Predicts fluid sensitivity issues

#### Rock Mechanics

- Data for calibration of acoustic velocity logs. Accurate assessment of porosity loss by formation compressibility. Determine rock strength for well bore stability and fracture potential

#### Special Core Analysis

- Engineering and petrophysical data that assesses your well performance from drilling through to exploitation. Optimizes production potential and reserves

### INNOVATIONS

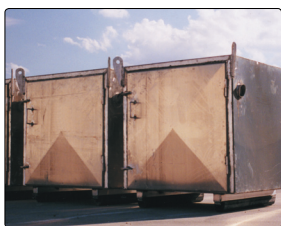
#### Processes

- Field gas and liquids collection including multi-rate separator sampling for rich gas condensates and volatile oils
- Critical condensate saturation, gas/condensate relative permeability and HPHT gas/liquid IFT

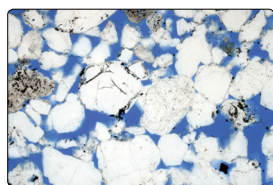


- Vapor desorption capillary pressure in tight gas sands
- Epifluorescence analysis (proprietary method for Thin Section preparation) for evaluating micro-porosity and micro-fractures
- Wellsite and laboratory tools for handling poorly consolidated samples
- Calculated permeability from Thin Sections, for perm estimation using percussion cores, cuttings and other “difficult” sample types

## INNOVATIONS



Weatherford Laboratories provides comprehensive services that support all of your oil & gas plays, in both conventional and unconventional reservoirs.



### Processes

- Electromagnetic separation for cutting analysis as a commercial service
- Capillary pressure and resistivity measurements at full reservoir conditions using live fluids by porous plate
- Integrated thin section petrography to evaluate proppant embedment



### Equipment

- CT software for 3D reconstructions and quantitative analysis
- Rapid XRD scanning using Lynxeye High Speed Detector
- D-4 automated X-ray diffractometer analysis – 66 samples per run

## COMPREHENSIVE CORE & FLUIDS LABORATORY TESTS

### FIELD SAMPLING OF CORE AND FLUIDS

Core Stabilization and Preservation  
Mobile Field Laboratory Services  
In Line and Separator Liquid and Gas Collection  
Multi-rate Gas Condensate Sampling

### CONVENTIONAL AND SIDEWALL CORE ANALYSIS

Permeability, Porosity, Fluid Saturations, Grain Density  
Probe Permeability  
Fast Track Cleaning – Pressure Extraction  
Laser Grain Size Analysis of Unconsolidated Sand  
Photography

### GEOLOGY

Thin Section Preparation  
Thin Section Description, Grain Size Analysis, and Calculated Permeability  
CT Scanning and Evaluation  
Scanning Electron Microscopy (SEM)  
X-Ray Diffraction (XRD)  
Detailed Core & Fracture Descriptions  
Biostratigraphy

### GEOCHEMISTRY

Organic Petrology (Ro, TOC, TAI, Visual Kerogen Analysis)  
Residual Oil Fingerprint  
Collection and Analysis of Cuttings

### GAS CONTENT ANALYSIS

Total Gas Content Analysis

Gas Isotope Analysis  
Adsorbed Gas Storage Capacity  
Free Gas Storage Capacity

### SHALE ROCK PROPERTIES (SRP)

As-received Mercury Bulk Volume Determination  
Crushed Preparation  
Fluid and Gas Saturation % PV  
As-received and Dry Gas Filled Porosity % Bv  
As-received and Dry Grain Density  
As-received and Dry Bulk Density  
As-received Pressure Decay Permeability

### ADVANCED CORE AND FLUIDS ANALYSIS

Mercury Injection, Centrifuge, and Air/Oil Brine Wettability Capillary Pressure Tests  
Relative Permeability  
Formation Damage Testing  
Electrical Properties Testing  
Water/Chemical Flooding  
Nuclear Magnetic Resonance (NMR)  
Calibration Testing  
Water Analysis  
Phase Behavior Tests  
Enhanced Gas/Oil Recovery

### ROCK MECHANICS

Young's Modulus and Poisson's Ratio  
Triaxial Compressive Strength Test  
Acoustic (Ultrasonic) Velocity Test  
Pore Volume Compressibility  
Proppant Embedment

## EXPECT MORE FROM WEATHERFORD LABORATORIES.

At **Weatherford Laboratories**, we are committed to Higher Standards. Our purpose is to continually move beyond conventional solutions to find new and better ways to optimize oil and gas production.

With 38 laboratories around the globe, our team sets the standard for wellsite sampling, core management services, geochemical analyses, and evaluation of traditional and unconventional reservoirs.

**At Weatherford Laboratories, we expect more from ourselves so you can expect more from us.**

# 38

LABORATORY LOCATIONS

# 18

COUNTRIES

# 1

WORLDWIDE RESOURCE

## 38 LABORATORY LOCATIONS IN 18 COUNTRIES

### NORTH AMERICA

Canada  
United States

### EUROPE

Norway  
United Kingdom

### LATIN AMERICA

Brazil  
Mexico  
Trinidad  
Venezuela

### MIDDLE EAST / NORTH AFRICA

Kuwait  
Libya  
Oman  
Saudi Arabia  
United Arab Emirates

### ASIA PACIFIC

Australia  
India  
Malaysia  
Thailand  
New Zealand

For contact information, please visit our website:  
[www.weatherfordlabs.com](http://www.weatherfordlabs.com)