

## EXPERIENCE & INNOVATION MAKE YOUR CBM PLAYS PAY OFF.

When you have to accurately determine the volume of gas-in-place and gas recovery from a coal bed methane reservoir – and make informed production decisions – **Weatherford Laboratories** is the right analytical partner.

Our know-how ranges from sample collection and analysis to formation evaluation and reservoir engineering. **Weatherford Laboratories'** experience includes over 800+ well studies in 30+ basins with 150+ clients over the past 15 years, more than 100 technical publications about coal bed methane analysis, and hundreds of industry presentations, underscoring our "frontier and emerging gas resource expertise."

Our ground-breaking focus on desorption work through canister experiments has paid off for CBM plays time after time. Around the world, **Weatherford Laboratories** offers you comprehensive and integrated analyses, giving you the best possible understanding of how to produce your reservoir.

Coal bed gas production is under commercial development throughout North America, Europe, Australia, Southern Africa and China – which is why we're there too: We are the experienced analytical partner you're looking for.

### HISTORY

#### Experience

- Largest sorption laboratory in the world
- Awarded over \$25,000,000 in research and development work
- Conducted a multi-million dollar, multi-year project that resulted in less than  $\pm 5\%$  variance when predicting reservoir storage capacity
- Developed sample selection protocols to maximize value while reducing costs



#### Papers/Studies

- Authored the Gas Research Institute books on gas content and reservoir engineering
- Over 800+ well studies in 30+ basins with 150+ clients
- More than 100 technical publications and hundreds of industry presentations

### CRITICAL COAL BED METHANE ANALYSES.

#### Gas Content Analysis

- Determines the total volume of gas present in a freshly cut reservoir sample (core)

#### Wellsite Canister Desorption

- Primary tool to quantify the volume and quality of gas to determine commercial potential

#### Desorbed Gas Composition

- Identifies the fractionation of gas over the life of the desorption history to determine a total in situ gas composition and the need for multiple gas isotherm data

#### Adsorption Isotherm

- Accurately determines the volume of gas that can be stored through sorption at reservoir temperature and pressure conditions

#### Clastic Sedimentology

- Classifies interburden and depositional environment

#### Maturity Assessment

- Determines coal rank and aids in the determination of coal properties

#### Effective Permeability

- Determines through well testing the key property controlling gas producibility of CBM reservoirs

#### Gas Saturation

- Using combined gas content and gas storage data, predicts the critical desorption pressure (CDP) when CBM gas production will start

#### Gas In Place

- Predicts the total volume of gas in the reservoir

### INNOVATIONS

#### Equipment

- Adsorption isotherm apparatus with high sensitivity temperature and pressure measurements specifically designed for CBM reservoirs



#### Processes

- Low rate in situ permeability testing for coals

#### Technologies

- "Core-Free CDP" service to predict the critical desorption pressure (CDP) of coal without core desorption
- Developed proprietary well test analysis software to calculate the permeability of CBM reservoirs under changing permeability conditions

## TURNKEY SERVICES SUPPORT YOUR COAL BED METHANE PLAYS.



### WELLSITE

- Wellsite Personnel for Core Stabilization, Packaging & Transport
- Aluminum 4x4x4 Core Transport Containers
- Portable Wellsite Gamma
- Wellsite Plug Drilling for Saturation Studies

### CORE PROCESSING

- Specialized Slabbing Techniques to Optimize Photography and Sedimentological Studies
- Specialized Plugging Techniques to Preserve As-Received Saturations
- Proprietary Procedures to Minimize Evaporation



### PHOTOGRAPHY

- High Resolution Core Photography in Multiple Formats

### CORE STORAGE & VIEWING

- Core Storage Facilities at 5 Temperatures Ranging from Ambient to Dry Ice
- State-of-the-Art Core Viewing Rooms



### PROJECT MANAGEMENT

- Secured Client Websites for Data Retrieval & Archival
- CoreTrac™: Internal Management Information System for Project Tracking, Accessible Worldwide

## COAL BED METHANE LABORATORY TESTS

### PETROLOGY

Detailed Core & Fracture Descriptions

### GEOCHEMISTRY

Organic Petrology (Ro, Maceral Analysis)

Collection and Analysis of Drill Cuttings

### GAS CONTENT ANALYSIS

Total Gas Content Analysis

Gas Isotope Analysis

Adsorbed Gas Storage Capacity

### OTHER TESTS

Helium Grain Density

Proximate Analysis

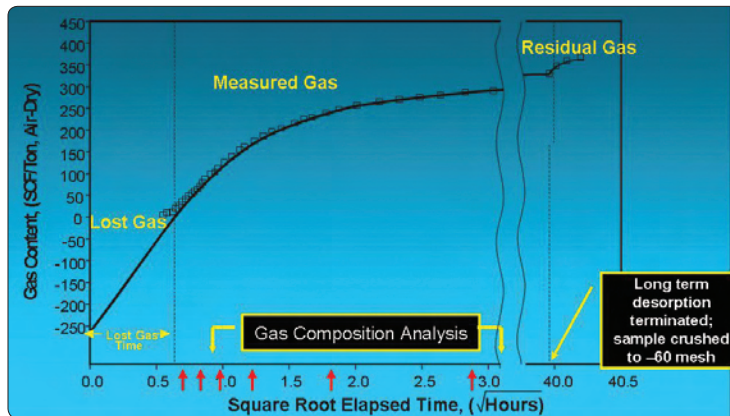
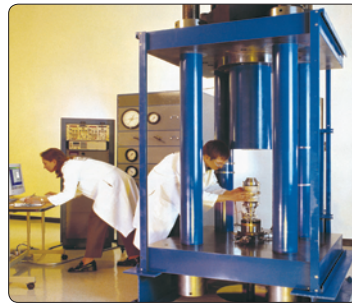
Ultimate Analysis

Gross Calorific Value (BTU/lbm)

Sulfur-In-Ash Analysis

In Situ Moisture Analysis

Petrographic Analysis



## EXPECT MORE FROM WEATHERFORD LABORATORIES.

At **Weatherford Laboratories**, we hold fast to Higher Standards. Our purpose is to continually push past conventional solutions to find new and better ways to optimize oil and gas production.

With 38 laboratories around the globe, our team raises the bar 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)