Among these firms are the industry leaders in regional core, fluids, and gas analysis...geochemistry and data management...hydrocarbon geochemistry...the characterization of coals, shales, and other unconventional gas reservoirs...formation damage and reservoir optimization...as well as two of the world’s largest core analysis companies.

Based in Canada, the United States, Australia, Europe, and the Middle East — with a worldwide network of satellite laboratories — these firms represent the best-of-the-best, a premier team of geologists, geochemists, analysts, engineers, technicians, and software developers committed to cultivating and delivering Higher Standards.

Joined together as Weatherford Laboratories, these companies create a Synergy previously unknown in laboratory services. The result is a single source for comprehensive laboratory analyses, a whole greater than the sum of its parts. Through this dynamic Synergy comes an elevated level of excellence providing unmatched intellectual capital, unparalleled expertise, superior technological knowledge, and a higher standard of excellence and innovation on a global scale.

This is the Synergy of Weatherford Laboratories.

Over the last quarter century, around the globe, a group of seven entrepreneurial companies has emerged as undisputed experts in laboratory services for the oil and gas industry.
Whether taking core in a deepwater environment at 30,000 feet, capturing cuttings in conventional oil and gas reservoirs, or gathering samples in challenging CBM, shale or tight gas formations, Weatherford Laboratories has the expertise, equipment and personnel to stabilize, preserve, process and analyze all core samples.

As the cost of drilling for oil and gas increases, so too does the need for exact downhole data. Weatherford Laboratories excels at retrieving, stabilizing and preserving wellsite samples for uncompromised laboratory testing. In addition, our mobile laboratories allow us to perform a multitude of services right at the wellsite. These include plugging, slabbing, preservation, and photography to document the true character of rock samples, and well testing and canister gas desorption to measure in-situ permeability and gas in place.

**EQUIPMENT**

- **State-of-the-Art Tools**: Automated band saws cut cores precisely and efficiently. High-speed drills handle plugging on site.
- **Transport Containers**: Customized containers ensure safe, secure transport of valuable cores. Fragile samples are stabilized in temperature-controlled containers.
- **Mobile Laboratories**: Offshore processing units feature plugging, core stabilization and photography capabilities. Onshore mobile units perform well test and gas desorption testing, plus PVT sampling for subsequent oil, gas and condensate analyses.
- **GeoJars™**: Gas impermeable containers preserve the integrity of cuttings over time. Since there is no loss of methane, accurate measurement of gas composition and carbon isotopes is ensured.

**PERSONNEL**

Experienced wellsite professionals including geologists, engineers and technicians oversee sample retrieval and provide total quality assurance. Their extensive training in safety procedures protects your investment.

**SERVICES**

- Core stabilization using epoxy, gypsum, foam, or dry ice as dictated by the project
- Wax dip preservation
- Core plugging and slabbing
- Core gamma
- Fluid sampling
- Documentary photography
The rock mechanics labs at Weatherford Laboratories analyze how rock will react under various stress/strain conditions, helping oilfield engineers make critical drilling and production decisions. Because these tests measure the actual strength of rock, they are essential in hydraulic frac design for tight gas and shale gas reservoirs.

In unconventional natural gas reservoirs, gas may be stored by compression (tight sands), by sorption (coal), or both (shales). The method for determining the gas content involves collecting core, placing it in a sealed canister, placing the canister in a water bath at reservoir temperature, and measuring the volume of gas that is released from the canister. This allows for the calculation of the volume of gas lost as the sample was brought to the surface, and more accurately estimate gas-in-place. Weatherford Laboratories is recognized as the world leader in this technology.

Our extensive library of geochemical data provides access to analyses at a fraction of the cost of traditional means and provides keen insight to basins worldwide.

- Detailed geochemical data on over 40,000 U.S. wells help define the prospectivity of an area without buying a lease or drilling a well.
- An extensive oil library provides critical data on API gravity, source maturity and other physical properties of over 10,000 fluid samples from around the world.

Weatherford Laboratories offers complete analytical and interpretive services in the field of organic geochemistry. These services include rock and oil screening analyses such as total organic carbon (TOC), programmed pyrolysis, and vitrinite reflectance, to detailed analytical services like mud gas composition, fingerprinting of rock extracts and oils, carbon isotopes, and biomarker assessments. In addition we offer exclusive services in compositional kinetics, pre-test API, viscosity, pour point, GOR, and oil-water saturations predictions.

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Appraising the size, shape and exact location of oil and gas reservoirs is both an art and a science. The science is conducted in a series of precise laboratory tests that, taken together, minimize uncertainty and predict reservoir performance. The art of appraisal comes only from experience — an unsurpassed asset at Weatherford Laboratories.

When appraising hydrocarbon formations, rock and fluid samples represent the ground truth. They are, in fact, the only downhole evidence that is not extrapolated. Subjected to rigorous testing at Weatherford Laboratories, these samples can accurately describe depositional environment, quantify reservoir quality, improve reservoir modeling, and provide accurate reserve estimates. Armed with this insight, you can assess reservoir potential more confidently and more accurately — and with reduced risk.

**Petrology & Sedimentology**

Petrographic evaluations provide direct measurement of total mineralogy (whole rock and clay types), texture and pore types — data that is essential to establishing diagenetic history and identifying low resistivity pay zones and other anomalous log responses. Sedimentology studies further refine reservoir descriptions by detailing the shape and morphology of reservoir rock, variations in reservoir geometry, seal type, fault planes, fracturing potential, and flow barriers. At Weatherford Laboratories, petrographic services can be performed on conventional, rotary sidewall, and percussion sidewall cores, as well as cuttings, outcrop samples, and produced material. Our geoscientists have extensive experience in characterizing clastic and carbonate conventional reservoirs, tight gas sands, shale reservoirs, unconsolidated sands, and heavy oil sands.

**Special Core Analysis**

Regardless of field location or play type, field development costs are huge. Successfully predicting hydrocarbons in place and/or individual well production over time is a risky business. The team at Weatherford Laboratories mitigates these risks by using advanced special core analysis techniques including proprietary centrifuge technology and porous plate de-saturation which are crucial inputs to the calculation of hydrocarbons in place. Together, full cycle capillary pressure and relative permeability curves create the ideal basis for production predictions.

**Engineering Consulting Services**

Unconventional reservoirs require complex analyses due to their heterogeneity and complexity. Through the interpretation of core data our professionals integrate geology and reservoir engineering data that enable the design of 3-D dual porosity reservoir models. Both core and log data are integrated to create processed logs that are used to estimate reservoir properties in cored and uncored intervals.

**Heavy Oil Optimization**

Weatherford Laboratories has developed a unique set of equipment and experimental protocols related to the optimization of heavy oil assets. These include a more precise understanding of oil in place and its properties, productivity under reservoir conditions, enhanced recovery by use of thermal or chemical means and the assessment of possible production and formation damage issues. Our experts can help to assess potential production problems with heavy oil and maximize recoverable reserves for a variety of heavy oil production scenarios.

**Adsorption Isotherm**

Weatherford Laboratories has developed proprietary equipment and processes to measure sorbed gas storage capacity as a function of increasing pressure at reservoir temperature for CBM and shale gas wells. When interpreted in combination with gas content data, adsorption isotherm services provide valid assessments of free gas volume, gas saturation level, critical desorption pressure, gas recovery factor, and gas volume abandoned in place.
Laboratory services play a pivotal role in reservoir completion strategies. With production success increasingly dependent upon what is known about a reservoir, laboratory analyses help quantify the unknown and reduce risk. The result is better wells, better recovery and better overall economics.

**Laboratory Services**

Consider that the cost of a single deepwater well can exceed $100 million. Or that it costs close to $250,000 to frac a single stage in a shale or tight gas reservoir. In this high stakes environment, Weatherford Laboratories provides certainty. Our experts supply you with answers regarding pay zones, formation damage prevention, fluid phase behavior, completion strategies, and reservoir stimulation. By reducing reservoir uncertainty, we enhance production and recovery — and help you produce all economically viable hydrocarbons from your reservoir.

**GEOCHEMISTRY**

Using proprietary instrumentation, the geochemists at Weatherford Laboratories are able to evaluate rock fluid properties such as API gravity, viscosity, apparent water saturation and bulk composition to identify pay zones. Thanks to the unmatched accuracy of these data, clients enjoy substantial cost savings by avoiding unnecessary completions, identifying bypassed pay zones, and improving well-site decision-making. Our specialists also excel in determining reservoir continuity, basin modeling, evaluation of reservoir effects such as water washing and biodegradation, and oil quality assessment prior to well completion.

**FORMATION DAMAGE ANALYSIS**

Weatherford Laboratories works with client samples such as cores, drilling fluids, and completion fluids to assess existing or potential formation damage. Laboratory tests can be performed at reservoir conditions of temperature and pressure using live reservoir fluids so that test results reflect true reservoir performance. Laboratory testing allows optimization of drilling and completion fluids to reduce the effects of permeability reduction due to drilling and completion operations.

**FLUID PHASE BEHAVIOR (PV/T)**

Identifying reservoir fluid types and their probable reaction under various temperature, pressure and volume conditions is pivotal information for field development and reservoir management. Weatherford Laboratories leads the industry in these analyses. By simulating behavioral changes in fluids as they are depleted over time, we are able to predict hydrocarbon reserves, propose production strategies, and advise clients about surface facilities to handle reservoir output.

**ENHANCED OIL RECOVERY**

Weatherford Laboratories uses a unique set of criteria for assessment of Enhanced Oil Recovery (EOR) candidates whether it be gas injection, water flood or modified water flood (chemical flood), steam flood and other novel approaches. A study of fluid phase behavior, mobility, interfacial tension, pore size distribution, gravity and wettability effects are used to create an accurate assessment of the EOR opportunity.
The true character of geological formations is revealed in rock, fluid and gas samples. They yield critical information whether you are prospecting for oil and gas or confirming development decisions. As such, their care and preservation are paramount. At Weatherford Laboratories, we have developed sophisticated systems to store, track and protect samples. As a result, you can review and reevaluate your materials time and again as new developments occur.

Weatherford Laboratories provides management services for the full life cycle of the core. Starting with sample retrieval at the wellsite, through online laboratory test results delivered in real time, to long-term storage with bar coded tracking, you have 24/7/365 access to the status of your materials.

STORAGE/TRACKING

Five Temperatures
With millions of cubic feet of storage space at five temperatures, Weatherford Laboratories has the right environment to protect your samples in perpetuity. Choose from ambient, air conditioned, chilled, frozen and dry ice storage at facilities around the globe.

Sample Management Tracking System
To provide maximum safety for your samples, sophisticated data management systems, including bar coding options, are used to track movement of your materials. Sample inventories can also be made available via our secured client websites.

360° PROJECT MANAGEMENT

CoreTrac™, an internal project management software system, stores all project information in one dynamic database that is accessible to team members worldwide. The result is seamless communication and maximum operational efficiency over the life of every project.

CORE VIEWING/MEDIA ROOM FACILITIES

Core viewing rooms are accessible 24 hours a day at all storage facilities. Each facility features private viewing and sample layout areas with both UV and natural light conditions. Slabbing, plugging and full laboratory services on site let you re-test core samples as needed. Additionally, a state-of-the-art media room is available for client workshops.

SECURE CLIENT WEBSITES

Password-protected private websites house data from all disciplines in one central location accessible 24/7 from anywhere in the world. These websites not only supply data as it’s being generated, but also serve as a data archive for completed jobs.
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.

Now seven companies strong, our accomplishments include 50 new technologies, 45 original products, 35 industry awards, and 13 registered patents. Among our ranks are several luminaries of the industry, as well as scores of respected scientists who have authored hundreds of scholarly papers.

You can count on us to be your analytical partner, to balance opportunity and expense, to lower risks from the platform to the boardroom. Our experts raise the bar on every aspect of laboratory services, providing greater insight and cutting edge solutions for maximizing reservoir performance.

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

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