Unconventional Resources
Shale Plays

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Meeting the Challenges of Shale Reservoir Development…

…requires technology, expertise, and tailored solutions at every stage.

The Schlumberger *more with less* approach revolves around the right combination of people, processes, and technology. This method is evident in how we evaluate shale reservoirs, achieve better well placement, improve drilling efficiency and completions—all to enable *more* production with *less* resource requirements.
Identifying whether a given shale play has sufficient quality rock, and where likely sweet spots are located, requires a detailed understanding and interpretation of available geological, geophysical, geochemical, and engineering data, from core to seismic. Our knowledge and expertise in shale reservoir evaluation leads to a more complete understanding of the shale play, which in turn leads to more informed decisions, less uncertainty, and greater economic success, helping you produce more with less.

**Analyze and interpret shale reservoirs**

Seismic analysis identifies reservoir and completion quality attributes, structural complexity, and dominant characteristics. Petroleum systems modeling assesses exploration risks before drilling, combining your seismic information, well data, and geological knowledge.

Benefits of our expert evaluation and analysis techniques include

- high-grade drilling locations through seismic processing, inversion, and Ant Tracking
- better understanding of anisotropy of shale reservoir
- delineation of shale reservoir sweet spots
- enhanced subtle-fault delineation
- detailed core measurements of rock permeability, porosity, and fluid saturation
- maximized well productivity and increased recovery.

**More effective completions operations**

The resulting model of your shale reservoir analysis includes comprehensive geology, petrophysics, and geomechanics information. As your acquired data grows, each successive well holds fewer surprises and more predictable and reliable results.
MORE PAY ZONE, LESS RIG TIME
Reducing time to drill to total depth is a key factor in drilling efficiency. Higher ROP, reduced number of trips, consistent build rate, and optimized drilling fluids also play a role in improving drilling efficiency.

Schlumberger technology and services enable optimized well placement, positioning wells to intersect the best pay zones efficiently and safely, and produce on time.

**Drill smarter, drill faster**

Keep your wellbore in the most productive zones. Drill longer laterals faster and with greater accuracy with PowerDrive Archer® rotary steerable system (RSS). This revolutionary, fully rotating RSS provides a higher build rate and a smooth, clean wellbore, increasing reservoir exposure.

**Enhance wellbore strength and limit lost circulation**

Advanced drilling fluids provide borehole strengthening, limit lost circulation, and adhere to ever-stricter environmental regulations. The M-I SWACO portfolio of all-inclusive drilling fluid products and additives increase drilling efficiencies and perform optimally in various shale plays, as well as in HPHT environments.

**Measure gas produced while drilling**

Fluid logging and real-time analysis help you better understand the producibility of intervals along the borehole and allow for smarter completions. We can obtain a unique quantitative analysis of C₁–C₅ components and qualitative information on the C₆–C₈ components and light aromatics in gas extracted from drilling mud, unaffected by drilling conditions such as mud type and temperature.

**Understand formations through mud logging services**

Advanced acquisition systems, through the intelligent use of geological data, hydrocarbon data, surface drilling data, and downhole drilling data, assist your critical decision making to assure safety and quality, and to maintain cost control.
MORE RESERVOIR CONTACT, LESS ENVIRONMENTAL IMPACT

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Rock properties and natural fracture distribution within shale reservoirs have significant implications for stimulation and recovery, and each play has unique property distributions that need to be considered.

The challenges of organic shale heterogeneity are properly addressed through optimized drilling fluids and hydraulics, as well as effective perforating operations and stimulation treatments. Through these integrated technologies, completion effectiveness is dramatically improved.

**Generate, maintain, and monitor complex fracture networks**

Advanced fracturing and completion services maximize your reservoir contact by offering the most efficient and effective reservoir stimulation service for each well. A wide variety of proven reservoir stimulation technologies exists. Each choice can be enhanced, and stage optimized, with real-time measurement options. Real-time visualization using data and models enhances operational planning and execution.

**Dramatically improve hydrocarbon recovery with effective completions**

When creating a conductive fracture, maximum surface area is the primary criterion. HIWAY* channel fracturing provides more fracture conductivity and optimized production. This service combines tailored placement methods, materials engineering, completion techniques, and process control equipment.

**Optimize placement of perforation clusters**

Detailed knowledge of lateral heterogeneity can help minimize the significant differences in perforation cluster contribution that are commonly seen in horizontal wellbores in shale reservoirs. Optimizing perforation placement makes completions more efficient and more productive. The resulting stimulation treatments then provide the best chance for every perforated cluster to produce gas. In openhole completions with frac ports, optimized port placement can improve well operability.

**Establish long-life well integrity, reduce environmental impact**

Fully protect surface groundwater zones via cementing best practices and evaluation technology. Use the latest green chemistry fracturing fluid formulations to reduce environmental impact.
Producing Shale Plays

Proactive and efficient production management technology allows planned recovery volumes to be achieved reliably and on time, reducing waste.

Increase mature well production rates

Understanding your reservoir and intervening when necessary in the well's productive life with solutions such as refracturing, artificial lift, and scale removal treatment is key to maintaining a well throughout its life cycle. Advanced production monitoring and forecasting tools help you better manage even mature well production and track reserves.

Manage frac and produced water

We provide cost-effective techniques for managing oilfield water, taking into consideration reservoir characteristics, produced water volumes, well design, and environmental concerns.

AquAlibrium™ represents the M-I SWACO all-inclusive approach to water management. AquAlibrium technology is designed for both unconventional and conventional applications where water reuse, environmental compliance, and optimized operational costs are primary drivers.

AquAlibrium uses proven, field-tested technologies for treating, recycling, and discharging or disposing of:
- drilling fluids
- fracturing flowback water
- produced water.

Optimize production with well testing and cased hole wireline services

A broad range of testing and measurement services delivers answers to your questions about productivity, fluid properties, composition, flow, pressure, and temperature. Cased hole services help you understand both your well and your reservoir to optimize lifetime production.

Refracture effectively for increased reservoir connectivity

Restimulation often allows a new fracture to reorient along a different azimuth, or an entirely new section of reservoir rock. This can restore well productivity to near original, or even higher, rates of production, extending the productive life of your well.

Initiate the ideal intervention with artificial lift

We lead you through the high-rate, initial flush period of production through intervention and artificial lift, when required, for wells that produce high liquids volumes.
Initiate the ideal intervention with artificial lift
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Shale Play Resources

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Case Studies
- Over USD 1 Million Saved on Marcellus Shale Wells
- Mississippian Shale Seismic Reservoir Characterization improves Gas Production
- Marcellus Shale—Real-Time Measurements Optimize Well Placement

Technical Papers
- Unlocking the Secrets for Viable and Sustainable Shale Gas Development
- How Lateral Measurements and Well Placement Impact Completions and Resultant Production
- Shale Gas Production Decline Trend Comparison Over Time and Basins

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