Schlumberger

Digital Pulsed Neutron

LIVE PL digital slickline production logging services

APPLICATIONS

- Locate oil, water, and gas contacts
- Identify known formations in development wells
- Conduct time-lapse logging of reservoir fluid interfaces
- Guide perforating by identifying gas contacts
- Evaluate gravel-pack placement
- Correlate from well to well

BENEFITS

- Leverage the efficiency and simplicity of slickline operations with the accurate depth control, digital capabilities, and real-time measurement quality of wireline-conveyed services
- Easily conduct operations with a short tool where rig-up height is constrained or space is limited
- Avoid the typical memory limitations of slickline logging with a high-performance lithium ion battery providing up to 15 hours of continuous operation
- Improve operational efficiency with tool combinability and multipurpose deployments
- Reduce risk in wax or debris accumulations by running with D-Jar* digital downhole adjustable jar

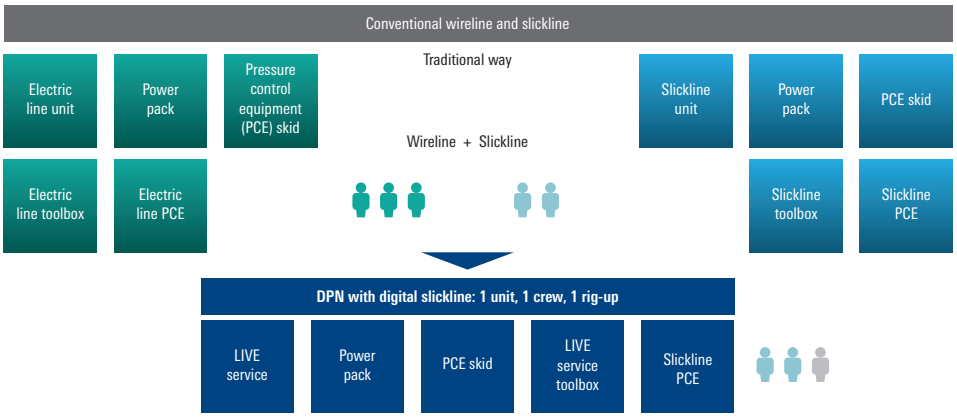
FEATURES

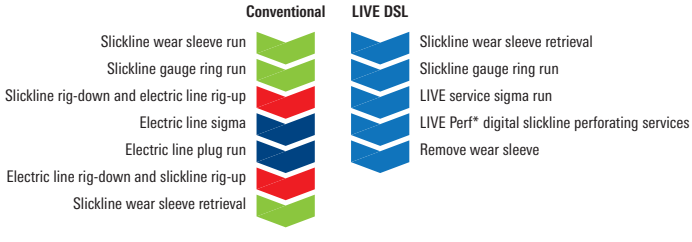
- Full compatibility with LIVE* digital slickline services
- Short, 1 11/16-in-OD tool for through-tubing conveyance and negotiating restrictions
- Deployment on 0.108- or 0.125-in digital slickline
- Sigma, apparent porosity, and gas indicator measurements
- Sourceless pulsed neutron generator
- Accurate real-time onsite depth control
- Logging speed up to 1,800 ft/h
- No memory limitations

As the latest addition to LIVE PL* digital slickline production logging services, digital pulsed neutron (DPN) service provides crucial information, such as fluid contact monitoring and fluid identification behind casing, to inform wellsite decision making for optimizing reservoir management and production in mature fields.

DPN pairs the field-proven Schlumberger small-diameter high-output pulsed neutron generator (PNG) with dual scintillation gamma ray detectors to provide real-time sigma measurement in mixed-salinity cased hole environments. Dual neutron burst with adaptive timing is performed to ensure the measurement's insensitivity to borehole conditions and eliminate the need for environmental correction. Measurement precision is further honed by using the available job planner.

Measurement Specifications	Digital Pulsed Neutron
Output	Sigma, apparent porosity, gas indicator
Logging speed	1,800 ft/h [549 m/h]
Range of measurement	0 to 60 cu
Vertical resolution	2.5 ft [0.76 m]
Precision	<±2% cu
Borehole fluid or formation water salinity	>50,000 ppm
Mechanical Specifications	**Digital Pulsed Neutron**
Temperature rating	302 degF [150 degC]
Pressure rating	15,000 psi [103 MPa]
Casing size—min.	4½ in
Casing size—max.	9⅝ in
Outside diameter	1.72 in [4.37 cm]
Weight	37 lbm [17 kg]





Sigma Logging and Plugback Comparison

- Equipment required reduced by factor of two
- Simplified PCE
- Reduction in crew size
- Two pressure tests eliminated
- Two conveyance changes eliminated
- Faster, simpler, reduced risk

The efficiency and simplicity of using DPN service on digital slickline with only one unit, one crew, and one rig-up save significant operational time over intervention operations that switch from slickline to electric wireline line for logging and back to slickline.

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