LithoTrak
Advanced LWD porosity service
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**Formation density—porosity accuracy**

Baker Hughes LithoTrak™ advanced LWD porosity service provides accurate, reliable and versatile nuclear porosity and formation density logs using an innovative downhole acquisition process. The service also provides azimuthally sectored density and photoelectric (Pe) images along with caliper measurements while drilling. Superior LWD reliability and repeatability

The LithoTrak service’s density measurement reliability separate it from other LWD porosity offerings. Tool design ensures more precise nuclear measurements, lowering the potential for standoff errors, such as those encountered by other logging techniques.

Azimuthal services available with the LithoTrak service include:

- Azimuthal imaging data for wellbore placement and positioning
- Azimuthal Pe available for open fracture identification
- Azimuthal caliper measurements for wellbore stability analysis

**Superior accuracy**

- Flexible acquisition schemes to meet multiple needs and ensure superior data accuracy:
  - Standoff binning
  - Azimuthal sectoring
  - Density imaging
  - Fast sampling rates:
    - Rapid data acquisition for highROP applications
  - Reliable acquisition:
    - All hole angle deviations
    - Managed standoff for long ECD intervals
    - Superior stabilizer protection
    - Protected detector section
    - Wear indicators
  - High-quality data acquisition in various drilling situations:
    - Straight hole rotary
    - Steerable motors
    - Rotary steerable systems
  - Reduced borehole corrections:
    - Optimized borehole design for accurate formation response

**Real-time advantages**

- Increased recovery from enhanced reservoir navigation:
  - Azimuthal density data
  - High-resolution density and Pe images for structural confirmation
  - Accurate, real-time density and neutron measurements:
    - Correlation to field marker zones
    - Early quantification of pay zones
  - Superior safety in tight ECD environments:
    - Reliable fluid content identification in high-permeability reservoirs
    - Reduced risk with improved wellbore integrity evaluation
  - Azimuthal caliper data
  - High-resolution density
  - Enhanced wellbore stability

**High resolution reservoir images**

Because the BHA is rotating during acquisition, data are azimuthally referenced to provide a density image of the borehole. The LithoTrak service’s 16-sector borehole image provides detailed information about the structural nature of the bed boundaries crossed. Real-time image data can be used to confirm or adjust wellpath trajectory in geosteering applications.

**Enhanced wellbore stability**

Reducing the assumptions present in the drilling process permit enhanced drilling hazard avoidance, improving safety and reducing wellsite non-productive time (NP1).

- The LithoTrak azimuthal caliper and imaging measurements provide enhanced representations of borehole shape that can be used to actively manage wellbore stability

**Application summary**

- Accurate, real-time quantification of porosity and gas identification for saturation calculations
- Reservoir Navigation using high-resolution imaging and gas/oil/water identification in real-time
- Wellbore stability analysis using azimuthal caliper and density imaging in real-time
- Structural formation dip analysis and updating reservoir models from density imaging
- Update seismic models with synthetic seismogram derived from density data and acoustic compressional data

**Enhanced reservoir navigation**

The LithoTrak service’s azimuthal density data allows operators to update their reservoir models while drilling to refine wellbore positioning for maximum productivity.

LithoTrak service’s real-time borehole images provide:

- Detailed geomechanical and structural information
- Early identification of the direction and the amount of bed dipping
- Enhanced reservoir navigation

**Accurate reservoir characterization**

LithoTrak services improve reservoir characterization with:

- Accurate density measurements and Pe (Photoelectric) data to identify lithology
- Caliper measurements are used to identify breakout directions and to quantify proper environmental corrections
- Mechanical property evaluation when integrated with SoundTrak™ acoustic logging while drilling service

LithoTrak service features can be employed in refining reservoir models with:

- High-resolution images for structural analysis
- Identification of thin sands and high-angle features
- Fracture detection through Pe images in weighted muds

**Proprietary standoff binning software** integrates a direct measurement of standoff with each density sample to ensure measurements with minimal standoff are given preference ensuring more accurate and precise formation density measurement.

The value of LithoTrak data can be further enhanced through the integration of additional Baker Hughes LWD services. The combination of LithoTrak density and porosity data with Baker Hughes’ superior OnTrak™ integrated measurement while drilling (MWD) and logging while drilling (LWD) service permits the calculation of high-accuracy saturation estimates while-drilling.

**In-situ stresses create breakout identifiable through azimuthal caliper and imaging**

- Time-lapse acquisition can help identify the location of increased cuttings, helping active equivalent circulating density (ECD) management in deep wells with dynamic pore pressure concerns

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